ICES WGICZM REPORT 2009

ICES SCIENCE COMMITTEE

ICES CM 2009/MHC:06

REF. SCICOM, ACOM

Report of the Working Group on Integrated Coastal Zone Management (WGICZM)

24–27 March 2009

GKSS Research Centre,
Geesthacht, Germany

ICES International Council for the Exploration of the Sea

CIEM Conseil International pour l'Exploration de la Mer

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Recommended format for purposes of citation:

ICES. 2009. Report of the Working Group on Integrated Coastal Zone Management (WGICZM), 24–27 March 2009, GKSS Research Centre, Geesthacht, Germany. ICES CM 2009/MHC:06. 89pp.

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Executive summary

The Working Group on Integrated Coastal Zone Management [WGICZM] (Chair: B. Morales-Nin, Spain) met at GKSS Research Centre, Geesthacht, Germany from 24–27 March 2009.

The highlights for this year's WGICZM meeting were:

1) The WGICZM discussed the aims and purpose of the WG in the framework of ICES, including the definition of coastal zone, and concluded that ICZM is an essential concept for bringing together multidisciplinary, multi-sectoral and interacting processes (social, ecosystem, economic, governance) in the coastal zone in a practical decision-making framework. ICZM allows for the harnessing of the complexity that makes up the coastal zone and should provide a forum where the work of many of ICES WGs can find a common, mutually beneficial platform. The overall objective of the WGICZM was revisited and defined as to provide scientific advice on the key issues related to the implementation of ICZM to improve the management objective to achieve sustainability in the coastal zone. The Group also stated the need that ICES considers the importance of emphasizing to the Member States the relevance of ICZM within ICES and the existence of this WG and its ability to provide related advice.

2) The need of ICES emphasizing the WGICZM results to make them known by other organizations was also noted in the context of their inclusion by the EU ICZM Working Group advice on possible policy options for a follow-up instrument(s) to the EU ICZM Recommendation (ToR a)

3) WGMHM has made a request for input from WGICZM with regard to MSP (ToR a). Therefore we recommend the following issues to be addressed by WGMHM: i) data translation and visualisation summarisation approaches; ii) the development of geo-spatial/temporal analysis tools that combine ecological and socio-economic modelling and assessment, taking into consideration existing relevant legislations, indicators and management action thresholds; iii) the development of geo-spatial visualisation tools for interactive policy scenarios. Also a closer relationship was suggested.

4) Based on the discussion last year on catchment-coast-ocean interaction, the Land-Ocean Interactions in the Coastal Zone (LOICZ) project was invited to present the status of their work for the WG (ToR f). Specific challenges that LOICZ is tackling are interactions between impacts of local/regional pressures versus global drivers and pressures as well as combining natural and social sciences with stakeholder consultations. All are highly relevant for the objectives and terms of reference of WGICZM. Therefore it was agreed the report on results and progress of LOICZ activities in ToR a, together with the reporting on international policy activities and other ICES WGs. LOICZ representatives will be invited to future meetings of WGICZM and joint actions between WGICZM and LOICZ will be explored.

5) The information gathered, albeit incomplete due to lack of some countries participation, showed that most ICES countries (ToR b) still have fragmented responsibilities for legislation and policies among authorities, and a lack of a legal framework to support ICZM nationally and internation-

ally, with concerns over the lack of compatibility among legislations at the national and eco-region (ICES) levels and the inefficient collection, communication, dissemination, and limited compatibility of available data sets. It has also become clear that many of the key issues facing decision-makers in the coastal zone are localised and therefore require a local solution. Few countries are making good progress on coastal issues, with the development of organisations to co-ordinate coastal management.

6) ICZM decision-making needs to be based on integrated scientific tools and innovative governance frameworks that provide practical, viable and meaningful advice to inform management actions. Such tools include spatial mapping, indicators, governance frameworks (such as participatory action, conflict resolution), and models. Therefore ICES should promote the adoption of a harmonized, structured decision-making framework for ICES Member States. By continuing to monitor existing and emerging decision-making tools and frameworks, WGICZM will be able to contribute to this recommendation and provide advice to ICES (ToR d).

1 Opening of the meeting

The Chair, Beatriz Morales-Nin, Spain, opened the meeting at 09:00 on Tuesday, 23 March 2009, welcomed the participants and made some announcements regarding domestic arrangements.

Seven ICES countries: Spain, Denmark, Germany, Norway, Belgium, UK and Canada were represented at the 2009 meeting. A list of participants is included in Annex 1.

Roland Cormier (Canada), Amy Diedrich (Spain), Grete Dinesen (Denmark), Clare Greathead (UK), Andreas Kannen (Germany) and Erlend Mokness (Norway) kindly agreed to draft parts of the report. Clare Greathead (UK), kindly agreed to act as general editor of the report.

2 Adoption of the agenda

A draft agenda was circulated in advance of the meeting which was adopted without changes. The adopted agenda is presented in Annex 2.

3 Core principles of the Working Group

The ICES WGICZM considers ICZM to be an essential concept for bringing together multidisciplinary, multisectoral and interacting processes (social, ecosystem, economic, governance) in the coastal zone in a practical decision-making framework. ICZM allows for the harnessing of the complexity that makes up the coastal zone and should provide a forum where the work of many of the ICES WGs can find a common, mutually beneficial platform. This reflects a global movement towards the recognition that maritime activities should not be managed by sectors. We recognize that this working group will contribute significantly to the ecosystem based approach paradigm shift within ICES.

The ICES WGICZM considers ICZM to be a conceptual point of departure for framing management problems in the coastal zone, which relies upon multidisciplinary scientific information and coordinated governance structures, with the primary objective of achieving sustainable development in the coastal zone. Coordinated governance requires cooperation and integration among different sectors and levels of government.

The implementation of ICZM requires practical, integrated scientific responses to address sustainability issues, including innovative models for management and decision-making. Science for ICZM should respond to specific needs and objectives of stakeholders and decision-makers which, in turn, should be used to define the spatial and governance context for each individual case. In this context, the WGICZM departs from attempting to generate a universal definition of the coastal zone and considers that its definition should be contingent upon the factors (ecosystem, environmental, governance, social, economic) that influence the management scenario.

This approach is in line with the definition adopted by the US Commission on Marine Science, Engineering and Resources (1969), also accepted by the EEA, that:

"there is no common or unique definition of what constitutes a ‘coastal zone’, but rather a number of complementary definitions, each serving a different purpose. Al-

though it is generally intuitively understood what is meant by 'the coastal zone', it is difficult to place precise boundaries around it, either landward or seaward. For example, the coastal zone itself is an area considered in some European countries to extend seawards to territorial limits, while by others the edge of the continental shelf at around the 200 m depth contour is regarded as the limit".

A general workable definition is:

"the part of the land affected by its proximity to the sea, and that part of the sea affected by its proximity to the land as the extent to which man's land-based activities have a measurable influence on water chemistry and marine ecology."

Within these contexts, the overall objective of the WGICZM is to provide scientific advice on the key issues related to the implementation of ICZM to improve the management objective to achieve sustainability in the coastal zone e.g. Thresholds, catchment-coast interactions, tools to trigger management action, integrated governance frameworks for ICZM in ICES countries. This reflects the original objective of the study group from 2003 that formed the basis for the establishment of this WG, as well as the three high priority areas stated in the ICES Science Plan (2009–2013).

WGICZM recommends:

- that, in accordance with the ICES Science Plan (2009–2013), ICES take into serious consideration the importance of emphasizing to the Member States the relevance of ICZM within ICES and the existence of this WG and its ability to provide related advice.

4 Terms of Reference for 2009 meeting

The Terms of Reference for the group were presented to the members in advance of the meeting and are presented below. Responsibility for compiling the information for each ToR was delegated to different WG members prior to the meeting.

ToR a) update and report on activities of relevant ICES Working and Study groups to identify information pertaining to coastal zone and evaluate this information relative to ICZM needs and review progress from the EU and IOC;

ToR b) update and report on ICZM activities in different ICES countries including information on initiatives towards integrated governance on the CZ;

ToR c) continue to monitor and report results generated from larger projects that are directly relevant to ICZM needs;

ToR d) progress the development of an integrated decision making framework for ICZM;

ToR e) evaluate the usefulness of assessing ecosystem goods and services in ICZM;

ToR f) report on progress on catchment-coast fluxes in the ICZM management plans of ICES countries.

WGICZM will report by 21 April 2009 for the attention of ACOM and SICOM.

4.1 Update and report on activities of relevant ICES Working and Study groups to identify information pertaining to the coastal zone and evaluate this information relative to ICZM needs and review progress from the EU and IOC (ToR a)

The 2008 ICES WG reports of relevance that were available on the ICES website were reviewed. Due to the timing of the meeting, only the 2008 reports were available. This means that some of the comments or identified needs for information may already have been taken up and considered by a group during 2008–2009, but would not be registered in this report. Due to time constraints only reports that were identified as relevant in the previous two years were reviewed and discussed.

The figure below (Figure 4.1.1) shows the role of this working group within ICES and the identification of different ICES Working Groups with respect to information on human activities or issues relevant to ICZM (Figure 4.1.2). A summary of relevant ICZM information from these WG is presented below.

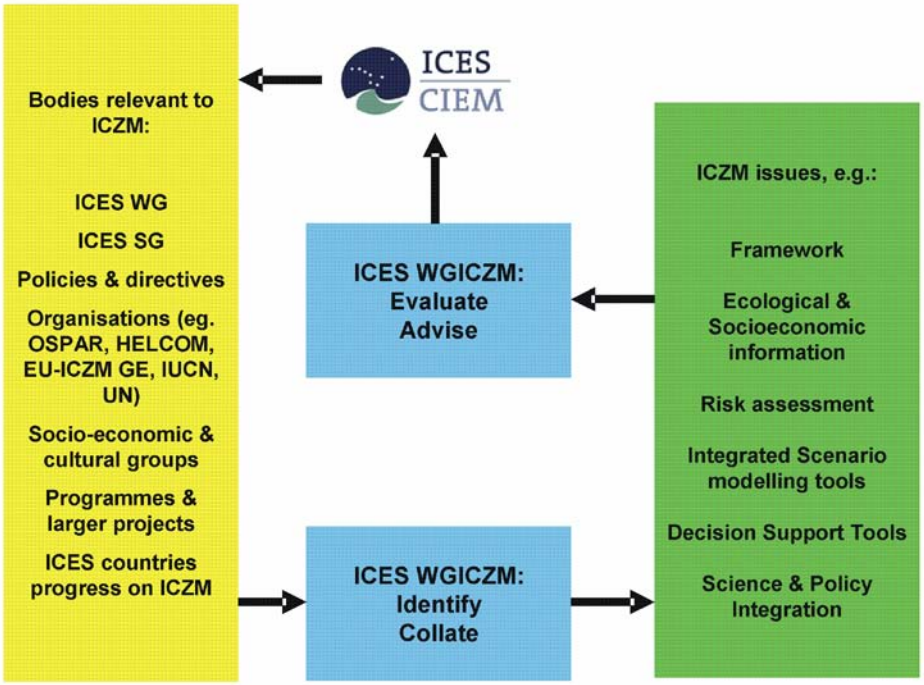

Figure 4.1.1. The role of WGICZM within ICES.

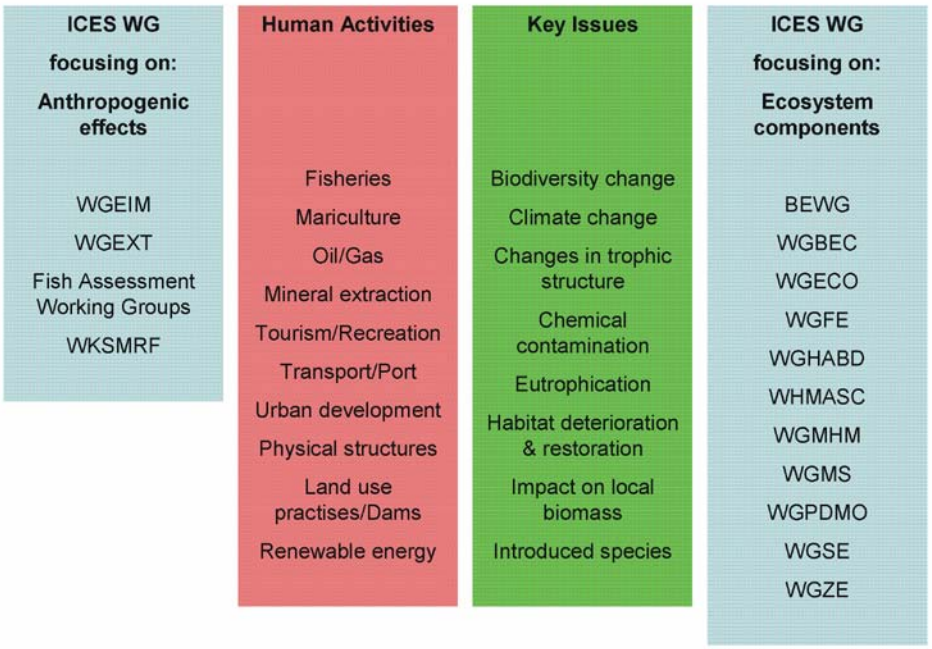

Figure 4.1.2. the identification of different ICES Working Groups with respect to information on human activities or issues relevant to ICZM.

4.1.1 Review of relevant ICES Working and Study Groups

Benthos Ecology Working Group (BEWG)

This WG completed 'The assessment of changes in the distribution and abundance of marine species in the OSPAR maritime area in relation to changes in hydrodynamics and sea temperature'. The group followed the lines of the SGWRECC and identified the major ways that benthic communities could be altered by the effects of climate change. All hypotheses were put into a conceptual model. The BEWG further reviewed the compilation of long-term series of benthic fauna in the OSPAR regions.

A workshop in November 2008 was thought to be an appropriate launch for the North Sea Benthos Project 2010.

BEWG also reported on several reports that link benthos with fisheries and aquaculture, climate enforced changes and the selection of appropriate indicators. The results of the Workshop on Benthos Related Environmental Metrics (WKBEMET), a spin-off of the work done within the BEWG on benthic indicators, were discussed. The Workshop highlighted some recommendations for future research and towards management and better development of assessments.

They reported a number of relevant initiatives including ECASA, a pan European study on the response of benthic indicators to fish and mollusc aquaculture activity; FishPact, which investigates the spatial distribution and mapping of potential impacts of bottom trawling on characteristic species of protected habitat types in the North Sea; and SUSUSE which examines temporal and spatial mismatches between biological processes and resource exploitation and management action. They commented that, when comparing climate enforced changes in the benthos in the Mediterranean to ICES waters, an increase in temperature is expected to have more impact in northern than in southern seas and that the impacts on ecosystems (incl. benthos)

could be stronger for enclosed (Mediterranean, Tyrrhenian, Adriatic, Baltic) than for open seas (Atlantic).

WGICZM considers the development of marine biological valuation maps useful within DSS and these are important for the integrated decision making framework for the coastal zone.

Working Group on Biological Effects of Contaminants (WGBEC)

This WG considered monitoring activities within OSPAR/MEDOL/WFD /HELCOM/EU-MSD) and also in respect to harmonization of AQC, for further cooperation and funding to organize common activities such as harmonization workshops, inter-calibration exercises and related issues between ICES (OSPAR), MEDPOL (Barcelona Convention) and HELCOM. In addition it was agreed that there was good value in taking advantage of the NORMAN network and their intention to organize workshops aiming at pan-European harmonization of biological effects methods including fresh waters, transitional and marine waters. The WG is relevant to ICZM because all the effects of contaminants upon coastal zones could have a strong effect on the ecosystem. The WG is very active on the review of the progress on the development of assessment criteria and integrated chemical-biological effect assessment tools.

Working Group on Ecosystem Effects of Fishing Activities (WGECO)

This WG was tasked with scoring interactions between the pressure of human activities and ecosystem components in a matrix, and attempted to use a risk-based approach that has recently been developed by the University of Liverpool and Cefas for the JNCC (Robinson *et al*., 2008). However the range of expertise in the group was not sufficient to complete this task.

WGECO has been developing frameworks for the provision of integrated ecosystem management advice since 2005. Several other approaches have been developed in parallel since this time. WGECO identified three different categories of assessment tool; those addressing the (i) likelihood of impacts, (ii) level of impact, and (iii) rating both likelihood and impact and thus can be classified as risk based approaches. Examples of these approaches were assessed and WGECO considered that the Robinson *et al.* (2008)[1] approach to prioritising the interactions between components and pressures was the most advanced of the techniques currently available and should be used to further populate the matrix.

WGECO was also tasked with starting the process of developing a framework to identify methodologies to assess and quantify the efficacy of gear-based technical measures introduced to reduce the environmental impact of fishing. An overall framework and a methodology for identifying significant adverse impacts to ecosystem components were developed in collaboration with WGFTFB. This methodology will be trialled at WGECO in 2009.

The work of this WG is an important step in the development of geo-spacial analyses and scenario modelling tools to support environmental assessment and decision making in ICZM issues.

[1] Robinson *et al.* (2008)[1]

Working Group on Environmental Interactions of Mariculture (WGEIM)

This WG has reviewed the applicability of sustainability indicators (SI) for aquaculture. WGEIM believe that the definition of environmental indices that represent discernible environmental changes as a result of mariculture rather than economic and social indicators is where its expertise lies. WGEIM have decided to remove the traffic light concept for aquaculture impacts and develop an alternative, more industry relevant system. WGEIM stated that sustainability can be assessed by linking the primary forms of environmental interaction of marine fish cultivation with an expression of acceptable effects on the marine environment, indicating the desirable direction of change. WGEIM addressed these assessments from national or regional scales rather than local.

WGICZM finds the development of mariculture SI's a valuable input for ICZM.

Working Group on Fish Ecology (WGFE)

WGFE has examined issues regarding Essential Fish Habitat (EFH) for several years now, in 2008 abundance-occupancy were addressed through three case studies. Methods for comparing maps of species distributions were explicated and a new method for multidimensional map comparison was proposed.

WGFE examined the impacts of climate induced changes in the marine physical environment on the distribution and abundance of fish. Many demersal and pelagic species changed abundance and distribution in all areas and while some of these changes can be attributed to changes in temperature between time periods, others cannot. It was also apparent that warming in some cases has meant that species once considered strays are becoming much more common. In other cases the warming has improved recruitment for some species

WGFE has reviewed studies proposing new indicators for characterising fish communities and testing how they respond to fishing, environment and their relation to other measure of fish community state. In 2007 WGFE constructed many maps of species distributions in relation to environmental variables. WGFE concluded that although the maps were helpful for presenting large amounts of information, it was realised that there were few analyses that dealt with quantitative comparisons of maps to find changes over time.

ICES – IOC Working Group on Harmful Algal Bloom Dynamics (WGHABD)

This WG aims to monitor the occurrence of HAB's and to develop models for the prediction of HAB's. The WGIZCM found that for ICZM purposes it was very useful and necessary to monitor the frequency of occurrences of HAB's as an ecosystem health indicator. In 2008, nothing reported was of relevance to ICZM. However, the group should consider how to identify, geo-reference, and asses risk of HAB events for ICZM purposes, that is, related to issues such as conservation of habitats, and to human activities such as fishery, aqua culture and tourism.

Working Group on Marine Habitat Mapping (WGMHM)

This WG has reviewed habitat mapping programmes and addressed the issue of data accuracy in habitat maps. They have started to outline a paper on the role of habitat mapping in an ecosystem-based context recognising the importance of habitat mapping to a wide range of marine management and policy contexts, including ecosystem functioning, coastal zone management, fisheries, protected areas and spatial

planning. The WG discussed new methodological developments and produced a series of guidelines and recommendations on how to proceed with mapping of habitats and other issues of relevance to development of tools for marine spatial planning (MSP) and ICZM. The products from this WG are important inputs and tools for the ICZM process as they provide basic information that are useful for geospatial analyses and modelling of scenarios for policy decision making in ICZ planning and management.

WGMHM has made a request for input from WGICZM with regard to MSP. After some discussions in the group it was decided that a list of questions/issues to be addressed by WGMHM was proposed:

1) The working group recommends that data translation and visualisation summarisation approaches be investigated.
   i. In addition to habitat mapping, these should include other significant ecosystem components such as spawning/nursery grounds, migration routes and key mating/feeding grounds that are vulnerable to human activities.
   ii. In addition, it would also include mapping of the intensity of human activities taking into account social, cultural and economical components.
   iii. The maps should illustrate the connectivity and coherence between land/sea interactions as it relates to rivers, coast and sea.
2) The working group recommends the development of geo-spatial/temporal analysis tools that combine ecological and socio-economic modelling and assessment, taking into consideration existing relevant legislations, indicators and management action thresholds.
3) The working group recommends the development of geo-spatial visualisation tools for interactive policy scenarios.

WGICZM suggests that a mutual ICES WG meeting be organized as a mini-workshop in 2010, with the objective to further discuss the above points (in Mallorca).

Working Group on Marine Shellfish Culture (WGMASC)

New developments in ICZM framework and their effects on shellfish aquaculture were revised. The main modifications occurred in the Industrial Installations and the Integrated Pollution Prevention and Control (IPPC) Directive and in the long term regular and harmonised monitoring efforts by the GMES system and the INSPIRE Directive. The latter directive has seen momentum by the Maritime Policy initiative and may be regarded as a promising step towards comparable data and results on the European level. However, relevant parameters/indicators (also on economic and social indicators) still need to be identified. Relevant indicators for shellfish aquaculture should be incorporated in the regular monitoring programmes on the EU level, in which data collection and exchange should be improved.

The scope for streamlining shellfish aquaculture throughout the EU has increased by the introduction of the Maritime Policy and by the link of terrestrial/coastal (as stipulated by the Water Framework Directive). In both cases, an ecosystems-based management approach is either already in place or planned to be formed. In recent years the EU has made significant progress in devising policies with respect to encouraging the integration of sectors and the involvement of stakeholders and the wider public.

As a case in point, the EU Cohesion policy aims to synergize economic and environmental concerns, especially taking local social-economic issues into account.

Marine Sediments in Relation to Pollution (WGMS)

This group reviewed marine sediments in relation to contamination, interface water-sediment, sediment dynamics relevance for monitoring. Calibration and analytical protocols were developed, as well as the collation of background contaminant values in the participating countries, were dealt with the group. All these issues are relevant for the behaviour of contaminants in the coastal zone.

Working Group on Pathology and Diseases of Marine Organisms (WGPDMO)

This WG dealt with many issues and updated on use of the Fish Disease Index for Baltic cod and flounder and for other sets of available disease data. A progress report was elaborated on ICES publications on pathology and disease of marine organisms, including ICES Identification Leaflets for Diseases and Parasites of Fish and Shellfish, and publications in the ICES Techniques in Marine Environmental Science Series (TIMES).Also data requirements were dealt by. Although not directly related to ICZM, these issues are relevant for the impacts than in CZ ecosystems might produce diseases generated by pollution, pandemics, etc.

Working Group on Seabird Ecology (WGSE)

This WG revised the effects on their population of by-catch by fishing revealing a big impact in several species. Although, there are few data to indicate the true extent of the by-catch problem, enough information exists to recognise that there is indeed a problem, and that the EU should develop and implement a Community Plan of Action aimed at investigating the issue further and at reducing this by-catch.

In response to an OSPAR request to ICES, WGSE in 2007 assessed changes in the distribution and abundance of seabirds in the OSPAR maritime area in relation to hydrodynamics and sea temperature. This issue was considered further in 2008 in relation to the framework provided by the ad hoc group established to advise on the use of appropriate hydrographic information, and the recommendations made by the ad-hoc group on working hypotheses regarding the effects of climate change. An updated overview of the topic is presented with two new case studies: the black-legged kittiwake in the North Sea and the Atlantic puffin in north Norway. While demographic parameters of the former were associated with one feature of climate, namely sea surface temperature, they appeared not to be with another, the strength of the North Atlantic Oscillation. Similarly, the hydrographic data provided proved of limited usefulness in analyses involving Atlantic puffin demographic data. The importance of selecting appropriate hydrographic data for use in seabird population analyses is emphasised.

Workshop on Sampling Methods for Recreational Fisheries (WKSMR)

In the WGICZM report 2008, recreation fisheries were considered an important issue for ICZM. However, knowledge and data for ICZM uses are lacking. The WGICZM find this first workshop on SMRF) highly important and will follow up on the outcome in next year's report.

4.1.2 Review of progress on policies and programmes of relevance to ICZM in the UN, EU and ICES member countries.

IOC continues its work in ICAM, with no reported changes available on the website (latest update in 2006).

In terms of general policy initiatives, Canada is moving forward on a number of initiatives relating to coastal zone management in collaboration with provincial, territorial and municipal jurisdiction. The initiatives are related to ecosystem-based frameworks and tools with a particular focus on inter-jurisdictional management of issues related to cumulative effects in the coastal zone (see ToR b Canada for details).

EU integrated Maritime Policy

On 10 October 2007, the European Commission presented its vision for an integrated maritime policy for the European Union. The vision document was accompanied by a detailed action plan and a report on the results of the broad stakeholder consultation. The document outlines an integrated maritime policy for the Union, enabling it to adequately address the opportunities and challenges arising from technological development, globalization, climate change, and marine pollution, among others, which constitutes a landslide shift from the sectoral approaches practiced so far.

The Communication and accompanying Action Plan list a range of concrete actions to be launched during the mandate of this Commission. These actions cover a wide spectrum of issues ranging from maritime transport to the competitiveness of maritime businesses, employment, scientific research, fisheries and the protection of the marine environment.

Highlights related to the implementation of the EU Integrated Maritime Policy in 2008 include: (i) the EC has proposed a European Border Surveillance System (EUROSUR) with the objective of preventing unauthorized crossings and enhance safety at ease and Europe's security, (ii) publication of Guidelines for an Integrated Approach to Maritime Policy, which describes how to mainstream integrated thinking and improve ocean governance, (iii) publication of the Agenda for a Sustainable and Competitive Tourism published by DG Enterprise, (iv) the launch of the Marine and Maritime Research Strategy by the DG Research, with the objective of integrating European research sectors and promoting interdisciplinary approaches, and (v) the establishment of European Maritime Day on 20 May.

The EU focus on ICZM has increased by the introduction of the Maritime Policy and by the link of terrestrial/coastal environments (as stipulated by the Water Framework Directive). During recent years the EU has made significant progress in devising policies with respect to encouraging the integration of sectors and the involvement of stakeholders and the wider public. As a case in point, the EU Cohesion policy aims to synergize economic and environmental concerns, especially taking local social-economic issues into account.

Global Monitoring for Environment and Security (GMES) and planned Directive for Spatial Information in the Community (INSPIRE)

GMES is a joint initiative of the European Commission and the European Space Agency designed to establish a European capacity for the provision and use of opera-

tional information for Global Monitoring of Environment and Security[2] The GMES represents a concerted effort to bring data and information providers together with users to provide a better security against natural and man-made hazards through improved tools of prediction and crisis management used by civil security entities. In this context the planned INSPIRE Directive has to be seen[3]. It is a framework that shall establish a common platform for annotating and sharing geographic data between member states – a spatial data infrastructure. It emphasizes the environmental reasons to share data between official agencies in different EC countries.

GMES in the context of the maritime policy is seen as the essential element for the establishment of an appropriate marine data and information infrastructure (EMODNET, see below) which in turn should enable strategic decision making on maritime policy, the expansion of value added services, and sustainable maritime development. In particular, EMODNET based on GMES and integrated with GEOSS will serve to increase the precision of estimates of the magnitude and impact of climate change.

A second field of maritime policy where GMES is expected to play an important role is the monitoring of activities at sea (maritime surveillance), such as border control and traffic monitoring. As the member states and relevant agencies move towards more integration between the various systems engaged in or using maritime surveillance, new applications developed by GMES can be successively integrated. The importance of the GMES has been reinforced by the Maritime policy initiative, which directly supports the safeguarding of shellfish cultivation operations.

URL: http://www.gmes.info/ and http://www.gmes.info/library/ and http://inspire.jrc.it/

The European Marine Observation and Data Network (EMODNET)

EMODNET will be a network of existing and developing European observation systems, linked by a data management structure covering all European coastal waters, shelf seas and surrounding ocean basins, accessible to everyone. EMODNET will thus provide the link between observations in different European waters and European environmental information which can then be assessed by scientists and the general public. This will create a large number of marine services in the field of monitoring, forecasting and marine safety. Depending on the specific tasks and problems in the different regions, there may be differences in details on the application of strategies and methods.

The main tasks in EMODNET[4] will be to: (i) build on and integrate the combined *in situ* and remote sensing of open ocean, shelf seas and coastal observation systems; (ii) harmonise different methodologies and strategies for data management under common protocols, data formats and quality control, and (iii) ensure that data can be consistently distributed for user applications including regional data interpretation, environmental assessments and modelling.

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[2] (EC, 2004a).
[3] (EC, 2004b; 2005b)
[4] The European Marine Observation and Data Network, Marine Board – EuroGOOS perspective 2009.

The scale of EMODNET next to global and regional is also local on the coastal zone: the coastal zone is an area of great physical and biological diversity and the area of greatest interaction between nature and anthropogenic forces represents one of the greatest challenges for observation, monitoring and assessments.

The EU ICZM expert group

To support the implementation of the ICZM Recommendation, the EU Commission facilitates an **expert group**, which held its first meeting on 3 October 2002. The Terms of Reference of the group and the minutes of its meetings are available on http://ec.europa.eu/environment/iczm/home.htm

The expert group consists of Commission, Member States, Accession countries and where necessary relevant invitees from stakeholder groups, academia and administrative bodies. Member states nominate representatives that are responsible for the implementation of the ICZM Recommendation. According to the agenda and topics to be discussed, the Member States can further invite to their delegations relevant other persons from national stakeholders and/or administrative bodies.

The EU Commission – DG Environment, introduced a new action launched by DG Environment in support of integrated coastal management (See project "Our Coast") and also established a new Working Group on ICZM (see below).

Working Group follow-up to the EU ICZM Recommendation

The evaluation of the EU ICZM Recommendation in 2007[5] concluded that the substance of the Recommendation, its approach and principles, remained valid, although the formal reporting and evaluation timeline of the Recommendation ended in 2006.

The evaluation indicated that for the medium- to longer term, however, the need for a new instrument would be reviewed. A number of sectoral policies as well as horizontal initiatives have evolved, and hence the context in which the ICZM Recommendation operates has changed. This calls for a re-assessment of the needs and most effective means to support ICZM in the longer term.

The Commission envisages proposing a follow-up to the EU ICZM Recommendation in (late) 2010. The process to define the follow-up to the EU ICZM Recommendation must be accompanied by an impact assessment.[6]. The impact assessment process includes use of expertise and consultation. Therefore a new working group is established.

The purpose of the Working Group is to provide strategic orientations in the early stage of the process leading to the follow-up to the EU ICZM Recommendation ("scoping"). These orientations will be set out in a report from the Working Group.

The Working Group focuses on the following aspects: problem definition, objectives and options and characterisation of the possible policy options for a follow-up instrument(s) to the EU ICZM Recommendation. This should lead to the identification of circa 4 options for inclusion in a detailed impact assessment study. The Working Group shall not attach priorities or preference to the options identified.

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[5] http://eur-lex.europa.eu/LexUriServ/LexUriServ.do?uri=CELEX:52007DC0308: EN:NOT

[6] http://ec.europa.eu/governance/impact/docs/key_docs/sec_2005_0791_en.pdf

The Working Group is open to all members of the EU ICZM Expert Group or their alternates. The experts act solely in their capacity as ICZM experts. A final report from the Working Group should be available by early September 2009.

The Working Group reports to the EU ICZM Expert Group. DG Environment will use, but shall not be limited to the Working Group's report and the discussion in the plenary EU ICZM Expert Group.

The working group discussed options like an ICZM protocol, another recommendation with new reports on implementation or a framework directive. The first result should be proposed to the EU-ICZM expert group in May 2009.

WGICZM Recommends that:

- the EU ICZM Working Group considers the recommendations of WGICZM in its advice to the EU ICZM Expert group on possible policy options for a follow-up instrument(s) to the EU ICZM Recommendation.

ICZM Protocol of the Mediterranean.

This Protocol of January 2008 requires ICZM strategies to be established, and specifies basic principles and rules. Although ICZM has been dealt with for a long time in the Mediterranean context, the Protocol is a significant step forward in legal terms. The Protocol is comprehensive, bringing for instance into ICZM the dimension of adaptation to climate change. The Protocol requires a pro-active approach to be taken, instead of merely reacting to coastal problems. The Protocol aims to strengthen integration, by requesting institutional coordination, coordination of national, regional and local authorities, involvement of stakeholders and civil society. Comparatively to other Protocols, the ICZM Protocol has attracted a very high number of signatures (14 of 22 Contracting Parties). To enter into force the Protocol needs 6 ratifications. Judging by the activities undertaken to support ICZM at this moment, the outlook for implementation of the Protocol is quite positive. But there will need to be continued political will, and re-sourcing, for ICZM in the longer term to make the Protocol really effective.

EU Strategy for the Baltic Sea Region (BSR).

The strategy is being developed at the request of the European Council of December 2007, who invited the Commission to present such a strategy by June 2009. It represents a territorial perspective of EU policies for the area, and could be a model for enhanced regional cooperation. Objectives are identified around environment, prosperity, accessibility, and security. All BSR member states have submitted non-papers to the Commission; a public consultation is on-going until the end of December. A consultation conference is further planned in Rostock February 2009. In December 2009, during the Swedish Presidency, the Council should be able to endorse a final Strategy and Action plan. For the environment, Sweden wishes to stimulate the BSR to become a marine and maritime best practice region. Especially phosphorous and other nutrients inputs must be reduced, over fishing stopped and heavy maritime traffic better controlled.

Maritime Spatial Planning in the EU.

The Communication on a Roadmap for Maritime Spatial Planning: Achieving Common Principles in the EU was adopted by the Commission in November 2008[7]. It provides information on current maritime spatial planning practices in the European Union (EU) Member States and in third countries, outlines the instruments which impact upon it and sets out key principles underpinning it. The Communication seeks to encourage a broad debate on how a common approach to maritime spatial planning can be achieved in the EU. The roadmap is an important product of the EU's new Integrated Maritime Policy, which the Commission launched October 2007.

Maritime spatial planning is necessary because increased activity on Europe's seas is resulting in heightened competition between different sectoral interests, such as shipping and maritime transport, offshore energy, port development, fisheries and aquaculture, and environmental concerns. This, in turn, is putting mounting pressure on already limited marine space. A more collaborative and integrated approach to decision-making is required to secure the sustainable development of marine areas in a healthy environment.

Maritime spatial planning is designed to promote rational use of the sea and improve decision-making. It seeks to balance sectoral interests and thereby achieve sustainable use of marine resources. Maritime spatial planning is a process which is determined by the specific needs and challenges of a given marine region and in which well-defined guiding aims, stakeholder involvement and data collection all feature prominently. The adoption of a maritime spatial plan is only one step in this process. It continues with monitoring and evaluation activities to make sure that the plan is enforced properly. It must also be reviewed, and revised where necessary.

Maritime spatial planning brings with it many potential economic benefits, but can also mitigate the effects of climate change, rising sea levels, acidification and increasing water temperatures, which have the potential to significantly affect maritime areas. Maritime spatial planning can promote efficient use of maritime space and the development of renewable sources of energy. Moreover, planning that takes account of the impacts of climate change can make for cost-effective adaptation to the threats posed by climate change.

Maritime spatial planning can contribute towards the sustainable management of fisheries in EU waters, and provide guidance and reliable data in seeking potential locations for aquaculture activities. It provides a basis for Member States to develop, in conjunction with other instruments such as environment legislation, impact assessments or integrated management plans for specific sea basins or ecosystems.

A growing number of EU Member States have already launched maritime spatial planning measures or will soon be doing so; for example the Irish Sea Pilot and the Scottish Sustainable Marine Environment Initiative (SSMEI) in the UK, or through international initiative, such as the EU project MESH, and the Interreg IIIB project BALANCE.

Implementation of maritime spatial planning is the responsibility of Member States. However, action at EU level can bring important added value; ICES could play an important role here in providing advice and possibly a recommended framework based on successful existing schemes.

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[7] http://ec.europa.eu/maritimeaffairs/spatial_planning_en.html.

There are a number of benefits to be derived from EU action on maritime spatial planning. The use of maritime spatial planning will lead to a more competitive EU maritime economy with healthy growth and employment rates and make Europe a more attractive prospect for foreign investment.

Coordination between Member States can also lead to less cumbersome procedures and lower administrative costs. Alongside this, balanced long-term management on sea and land will also benefit the ecosystem as a whole.

National decisions have an impact on countries that share a marine region or sub-region. Likewise, many issues transcend national borders. The EU's role is here to facilitate understanding and coordination between Member States in order to tackle common challenges such as climate change, energy security and economic development. Member States sharing a common approach to the management of marine space in the same sea basin will find it easier to meet these challenges. The Commission is looking to encourage Member States to heed cross-border impacts in their national decision-making.

The roadmap sets out the means for creating this added value. The information on existing practices and the set of key principles for maritime spatial planning that it contains should help fuel a debate on maritime spatial planning at EU level.

To facilitate the debate on maritime spatial planning, the European Commission will organise workshops in 2009 to discuss the options for implementing maritime spatial planning in the EU and the specific key principles set out in the roadmap. The outcome of that debate will serve as a basis for conclusions and recommendations to be issued by the Commission later in 2009. WGICZM could play a role at these workshops by ensuring that examples of best practice for MSP are presented, and if there is time put together a guidance document.

WGICZM recommends:

- to continue to update and report on activities of relevant ICES Working and Study groups to identify information pertaining to the coastal zone and evaluate this information relative to ICZM needs and to monitor progress on policies and programmes in the UN, EU and ICES member countries.

4.2 Update and report on ICZM activities in different ICES countries including information on initiatives towards integrated governance in the CZ (ToR b)

Issues:

- There are still issues surrounding cross-border collaboration and inter-departmental rivalries in regard to marine resources, such as wind farm locations along the German and Dutch border.
- Most countries still have fragmented responsibilities for legislation and policies among authorities, and a lack of a legal framework to support ICZM nationally and internationally,
- There are also still concerns over the lack of compatibility among legislations at the national and eco-region (ICES) levels and the inefficient collection, communication, dissemination, and limited compatibility of available data sets.

- Some countries are not participating in this working group so it is difficult to assess progress in these countries.

Successes:

- There is a general recognition that healthy marine resources are of benefit to both the species and habitats and human health, social and economic well-being. The human exploitation of those resources therefore needs to be managed sustainably; it is widely recognised that ICZM is one tool that can help deliver sustainable management of the coastal zone.
- It has also become clear that many of the key issues facing decision-makers in the coastal zone are localised and therefore require a local solution.
- Most countries are making use of GIS to aid coastal planning by mapping and evaluating marine resources use and developing integrated data management initiatives.
- Canada and Belgium are making good progress on coastal issues, with the development of organisations to co-ordinate coastal management; Centre of Expertise on Coastal Zone Management in Canada and the Coordination Centre in Belgium. The UK has also started working towards more integrated marine management with the introduction of Marine Management Organisations (MMOs).
- Our coast – evaluation of ICZM strategy (See ToR c)
- SPICOSA (See ToR c)
- Good initiatives being developed by different countries that can be used to help ICZM progress in other ICES countries, e.g. the development of Large Ocean Management Areas (LOMAs) in Canada, and SSMEI in Scotland.

Please see Table 4.2.1 for summaries of progress towards ICZM in ICES member countries.

WGICZM recommends:

- to continue reporting on ICZM activities in ICES member countries including information on initiatives towards integrated governance in the CZ.

4.3 Continue to monitor and report results generated from larger projects that are directly relevant to ICZM needs (ToR c)

This ToR reported on several large projects that are relevant to ICZM needs. One of the new projects "Our Coast" is very relevant and overlaps significantly with the work of this working group. The table include significant multi-national projects occurring in Europe and North America. Key information about the projects is summarised in Table 4.3.1 below.

WGICZM recommends:

- WGICZM recommends that it continue to monitor and report on the results generated from larger projects that are directly relevant to ICZM needs.
- WGICZM recommends that a representative from the "Our Coast" project be invited to participate in the working group.

Table 4.2.1: Current ICZM activities and progress in different ICES member countries

Issue	Canada	Denmark	Germany	Ireland	Norway	Poland	Spain	Sweden	UK
Updated	2009	2009	2009	2008	2009	2006	2009	2007	2009
Has the coastal zone been defined for management?	Between low water mark and 12 nautical mile line	Between 3 km inland and either 6 m depth or 1 nm seaward	No, Entire German Continental Shelf is considered	No, coastal boundaries defined by WFD, EEZ, ICES areas	No The EU WFD definition of 'coastal water': 1 nautical mile off the baseline is adopted	Not reported	EU WFD definition of 'coastal water':1 nautical mile off the baseline of interior waters is adopted	No	Guidance Note 20 on coastal planning offers guidance on defining the coastal zone.
Competent authority for coastal zone use	Department of Fisheries and Oceans	Sea: Two ministries and three authorities. Land: One ministry via the Agency for Spatial and Environ-mental Planning. From 2007, 78 coastal municipalities will be responsible for CZM.	Land and coastal waters (12 sm): Laender, for some issues sectoral responsibilities (e.g. public waterways), EEZ: Federal Ministry of Transport, Building and Urban Development is responsible for spatial planning	Department of Agriculture Fisheries & Food. Department of Environment (& local authorities) for planning & development on terrestrial side. (Departments restructured in 2007)	Several ministries and directorates. Counties and municipalities. Municipalities are leading the planning of their areas, both on land and in the sea (from land to the baseline)	Not reported	There are 2 levels of management, at the Estate level: Directorate General of Coasts(Direccion General de Costas),; at the regional level (federal governments) Regional Autonomous Authorities:	12 authorities have on a sectoral basis competence in relation to the use of the coastal zone. The municipalities lead the physical planning out to 12 nm.	Scotland: Scottish Executive England and Wales: Department for Environment Food and Rural Affairs (Defra)- Marine Environment Division
Is there a consultation process? Who is then involved in	Integrated management plans, rules governing oceans and	Consultation with sectors and stakeholders	Consultation with sectors and stakeholders within statutory	Depending on the issue but normally with other Departments,	Consultation with sectors and stakeholders	Not reported	Master Plan for Coastal Sustainability (POL in Cantabria,	The local communities and resource users through the process of	Yes Intergovern-mental co-operation

the consultation process?	fisheries, new oceans governance arrangements, ecosystem science		planning procedures	Governments Agencies, NGO and stakeholders			POLA in Asturias, PDUSC in Catalonia, PTSL in the Basque Country); Territorial sectorial plan of the littoral zone; and the city level	municipal planning and hearings; The sectoral authorities; user's organizations; the Co-management groups, where these exist.	Coastal Fora Stakeholder involvement
Responsible authority ICZM (EU Recommend ation)	Not reported	Ministry of Environment	Federal Ministry for the Environment, Nature Conservation and Nuclear Safety	Department of Agriculture, Fisheries & Food. (CZM section)	Not reported	Not reported	Ministry of Environment, Ruaral and Marine Environment created in April 2008	The National Board of housing, building and planning (NBHBP)	Scottish Executive and Defra
EU ICZM Stock-take (1)	Non-EU yes	Ministry of Environment. Two reports. No decisions as yet on how to proceed.	Yes	In progress	Not reported	No	Yes	In progress	Yes
EU ICZM Strategy (2)	Non-EU yes	No strategy formed as yet.	Partly	Stocktake drafted. No formal strategy since 1997 Draft ICZM Policy	Not reported	No	Yes	In progress	Yes
Key activities identified	Ground fishing, oil and gas exploration, aquaculture,	1. Coastal marine wind farms,	1. Offshore wind-farms, 2. Marine	1. Shipping and maritime transport,	Marine resource exploitation Limited	1. Seasonal tourism, 2. Coastal	Urban and mass tourism development, coastal	1. Fishing, 2. Recreational fishing,	Aquaculture Fishing Harbours and

	pollution near urban areas	2. Aquaculture, 3. Harbour & coastal defence structures, 4. Nature & habitat restoration, 5. Mineral extractions, 6. Pipelines, 7. Dredging 8. Mussel farming, 9. Fishery, incl. recreational, 10. Shipping & boating, 11. Tourism, 12. House boats, and 13. Agriculture.	aggregate extraction, 3. Fishing, 4. Nature conservation, 5. Development of ports and harbours, 6. Tourism, 7. Coastal defence, 8. Aquaculture and Blue Biotechnology	2. marine energy, 3. Aquaculture, 4. Marine tourism, 5. Fishing, 6. Nature conservation,	knowledge of coastal species and processes Fish stocks Carrying capacity Introduced species Aquaculture	urbanisation, 3. Coastal industries, 4. Comercial and fishery ports, 5. Land reclaim for agriculture,	occupation, recreational uses (fisheries, marinas), intensive aquaculture and fishery	3. Tourism, 4. Marine resource exploitation,	shipping Off shore energy Power stations Distilleries Recreation
Key Issues identified		1. Spatial competition, 2. Un quantified environmental impacts, 3. Coastal eutrophication & pollution and urban areas, 4. Habitat loss & deterioration, 5. Overexploit-ed fish stocks,	1. Spatial competition, 2. Habitat loss, 3. Over-exploited fish stocks, 4. Coastal pollution,	1. Spatial competition, 2. Eutrophication & Environmental impacts, 3. Improve knowledge gap on resource use 4. Carrying capacity issues. 5. Over exploited fsh stocks, 6. Real		1. Coastal pollution and carrying capacity issues, 2. Coastal pollution, 3. coastal pollution, 4. Habitat loss and spatial competition, 5. Habitat loss,	Overexploitatio n of natural resources, hydromorpholo gical alteration, eutrophication, ecosystem changes (jellyfish blooms, biodiversity changes, habitat destruction),	1. Poor economy in the commercial fisheries and over exploitation of fish stocks, 2. Local over-fishing, 3. Coastal pollution and carrying capacity issues,	Large % of pop in coastal areas. 31% coast developed 40% manu-facturing industry in coastal area. Spatial issues Marine resource exploitation Flooding and erosion

		6. Climate change, incl. floding, erosion & increased temperatures, 7. Carrying capacity issues, and 8. Mineral extraction.		time monitoring & better knowledge of marine events.			water quality	4. Conflicts between stakeholders Increased use of marine resources,	Fish stocks Aquaculture Marine renewables
ICZM relevant Legislation	Oceans Act 1997	System of laws Protection of Nature Act (1992) Planning Act (2000) EU Directives (WFD, HD, BD, MSD), Integrated Maritime Policy	Nature Conservation Act, Federal Building Act, Planning jurisdiction to MHW	Planning jurisdiction to HW Foreshore Act between HW and territorial limit-licences for marine works, Local Government Planning & Development Acts – planning on the terrestrial side. Sea Fisheries Acts – regulation of sea fishing. Foreshore Acts - licensing for aquaculture. Water Quality & pollution legislation. Transposition	More than 13 relevant laws including planning, management, fisheries, aquaculture pollution, nature conservation, recreation, navigation etc.	Not reported	The Shores Act = Ley de COSTAS (22/1988, July 28th), Law on Evaluation of Plans and Programmes (Ley de Evaluación de Planes y Programas) (application of the Strategic Environmental Assessment Directive); Eu Framework Directives: Water, Habitat,Flows, Marine Strategy	The planning and building Act (1987) The Environmental Code (1999) The Fisheries Act (2003)	Planning jurisdiction to MLWS. Crown estate lease required to 12 nm. Licences required for coastal and marine works (FEPA), other discharges and aqua-culture also require a licence (CAR)

				of EU Legislation on WFD, BWD, HD, Shellfish Water Dir.					
Precautionary approach applied?	Yes	yes	Not reported	Yes – in the decision making process	yes	Not reported	Not reported	Yes, to a certain extent on a sectoral basis and in the municipal planning process.	Yes – in theory
National ICZM projects, consortia or networks	integrated management pilot programs	Not reported	Zukunft Küste –Coastal Futures and ICZM-Odra (both research), EUCC Germany (network), several smaller projects/ consortia	I-CoNet initiative. AquaReg CZM. Corepoint.	GIS Maps of marine nature for use with ICZ planning and Management	Not reported	HISPACOSTA EKOLURRAL-DEA (Basque Country)	ENCORA/ SENCORE Regional and local projects	Local Coastal forums/Partnerships Regional schemes e.g Irish Sea Pilot and SSMEI.
Integrated data management initiatives	Not reported	Through MariNet (not active), The Danish Nature & Environment Portal (DMP)	CONTIS (Continental Shelf Information System), GeoSeaPortal, several other projects on environmental data and/or meta data	National Sea Bed Survey. http://www.gsiseabed.ie/ Marine Data Repository Smartcoast. Smartbay. Aquareg CZM	Not reported	Not reported	In development an Integrated Data management system for the Director Plan on the Sustainable Coastal management (http://www.gisig.it/eco-imagine/pres	Ongoing process. Models for integrating data on recreational fisheries are being designed.	UKDMOS MDIP MCEN UKSEAMAP

							ppt/Nice/		
Environmental national research initiatives relevant to ICZM	ecosystem overview and assessment report (EOAR), map of ecological and biological significant areas (EBSA)	BERNET, BALANCE. Baltic Sea Breeze, WATERSCETCH, Safety at Sea, Comrisk, comcoast, lancewadplan, Wadden Sea Forum, POWER, FSII, PROTECT, COEXIST SPICOSA, OUR COAST	Several projects and programs, not all directly related to ICZM, but to coastal environmental change	National Sea Bed Survey, Review of Marine Environmental Indicators. Smartcoast	GIS Maps of Marine nature MAREANO Project on the ecological impact of introduced King Crab.	Not reported	There are 17 ongoing R&D National Funded Projects with a wide range of objectives from GIS to biodiversity including socioeconomic aspects, EU Funded initiatives (SPICOSA)	Swedish EPA is supporting many research initiatives of relevance. Major programs such SUCOZOMA and WASTRA are now completed. Sweden is involved in EU-projects of relevance such as Interreg.	
Socio-economic issues considered into ICZM	Yes, human use atlas	Geo-spatial information on ecosystem goods & services, and cultural and socio-economic uses/values are not all available, and not integrated between sectors and governance bodies	See key activities and key issues, conflict resolution mechanisms	National Spatial Strategy County Development Plans	Municipalities plans for their coastal zones, Statistics from fisheries and aquaculture	Not reported	There are several initiatives at Regional level in development, the State main source of information is the Statistics National Institute (Instituto Nacional de Estadistica) whre a GIS at municipality level is	Conventional socio-economic data is used in planning.	Socio-economic studies e.g. PML project

							available		
Initiatives towards integrated governance on the CZ			Consulting projects ongoing on structures to implement ICZM, focus on non-statutory and voluntary structures, establishment of Maritime Spatial Planning (Draft spatial plan for EEZ published and discussed in public hearings)			Not reported	AENOR-practical guide for the implemantion of ICZM in Spain (report to be published this summer)	Not reported	Marine Bills and Maarine Management Organisations (MMOs)

(1) EU ICZM Stock-take: this issue indicates if the stock-take process has been finished, to be followed to draw up a national rapport to implement ICZM according to the EU ICZM Recommendation

(2) EU ICZM National Strategy according to the EU ICZM Recommendation or an additional action instead

(3) Marine protected coastal areas: Natura 2000, OSPAR Marine Protected areas, Habitat and Bird Directive protected areas, World Heritage areas or others

Table 4.3.1: Summary of larger projects that are directly relevant to ICZM needs

Large ICZM Initiatives	DATES	Area	Key issues	Website	Contact person
Knowseas	2009–2013	Europe	Strengthen the science base for managing Europe's seas through the practical application of systems thinking working at the Regional Sea Scale and Member State Economic Exclusive Zones (EEZs). Key initiatives include: - Decision Space Analysis approaches new studies of climate effects, fisheries and maritime industries - case studies for assessing changes to natural systems and their human causes - research social impacts of changes to ecosystem goods and services - costs and benefits of various management options Institutional and social analysis		Contact: Laurence.Mee@sams.ac.uk
OURCOAST	2009–2012	Europe	Aims to ensure that lessons learned from the coastal management experiences and practices will be shared and made accessible to those who are seeking sustainable solutions to their coastal management practices. Numerous tools, studies and development activities include: - A multi-lingual database of Europe-wide ICZM practices - review of ICZM case studies - Comparative analysis of the state of the art ICZM	ec.europa.eu/environment/iczm/ourcoast.htm	

			- Review of relevant EU policies and legislation - Guidance for future integrated coastal and marine planning - Setting of an implementation agenda of ICZM and contact lists		
IMCORE	2008–2011	NW Europe	Promote trans-national, innovative and sustainable approach to reducing the Ecological Social and Economic impacts of climate change on coastal resources		v.cummins@ucc.ie CMRC, University of Cork, Ireland
Gulf of Maine Council on the Marine Environment	2007–2012	Canada/US Gulf of Maine	Maintain and enhance environmental quality in the Gulf of Maine to allow for sustainable resource use by existing and future generations. The council	www.gulfofmain.org	Contact:
SPICOSA	2007–2011	Europe	Integrating science and policy through a Systems Approach Framework that allows the assessment of different policy alternatives.	www.spicosa.org	Daniel Roy (Spicosa Project Manager), IFREMER Centre de Brest Technopole Brest Iroise BP 70, 29280 Plouzané, France
ENCORA	2006–2008	Europe and N Africa	ENCORA and other networks have established to harness knowledge and resource capabilities in Europe towards more sustainable use of coastal and marine resources and the conduct of maritime affairs. An external review of the ENCORA project was conducted by Professor Peter Burbridge and can be downloaded from the Encora Portal.	www.encora.org	
AQUA REG	2005–2008	Europe	To provide opportunities and design strategies for sustainable development of peripheral coastal communities by promotion of inter-regional co-operation in aquaculture and	www.aquareg.com	Gabriel de Labra Chas, Galacia (e-mail: glabra@cetmar.org) Sigurd Bjørgo, Norway (e-mail: sigurd.bjorgo@stfk.no)

			fisheries. Application of seabed mapping to coastal management and the development of Geo-databases for the pilot areas		Alan Drumm, Ireland (e-mail: alan.drumm@marine.ie)
PROTECT	2005–2008	Europe	The overarching goal of the project was to strengthen the decision base regarding marine protected areas (MPAs) in Northern Europe as part of an ecosystem-based approach to fisheries management. Result reported: - Marine Protected Areas as a Tool for Ecosystem Conservation and Fisheries Management - Report on the State of the Art of MPAs as a Tool for Ecosystem Conservation and Fisheries Management - Knowledge required to model & management success criteria - A study on monitoring strategies for MPA's	www.mpa-eu.net.	Scientific Coordinator: Erik Hoffmann info@mpa-eu.net
COREPOINT	2004–2008	NW Europe	Result reported: the book "Who Rules the Coast?" Policy Processes in Belgian MPAs and Beach Spatial Planning), edited by Dirk Bogaert and Frank Maes The book represents the results of two years of research carried out in the framework of project consisting of a thorough scientific analysis of two policy processes in the Belgian marine and coastal environment: the designation of the marine protected areas and the drawing up of provincial spatial implementation plans for beaches and sea dikes. The book analyses the legal framework and the concrete application of this for both cases.	corepoint.ucc.ie	v.cummins@ucc.ie Coastal and Marine Resources Centre (CMRC) University of Cork, Ireland

ECASA	2004–2007	Europe	- to identify indicators of the effects of aquaculture on the environment and vice-versa, and to assess their applicability; - to develop operational tools, including models, to establish and describe the relationship between environmental conditions and aquaculture activities over a range of ecosystems and aquaculture production systems; and - to develop effective environmental impact assessment and site selection methods for coastal area management.	www.ecasa.org.uk	Averil Wilson (averil.wilson@sams.ac.uk), Kenny Black (kenny.black@sams.ac.uk)
LOICZ	1993–2012	Global	Biogeochemical fluxes, ecosystem governance, social-ecological systems analysis	www.loicz.org	Hartwig Kremer (Chief Executive Officer), hartwig.kremer@loicz.org
ACZISC	1992 (Established)	Atlantic coast	Foster cooperation in Atlantic Canada with regards to Integrated Coastal and Ocean Management (ICOM), coastal mapping and geomatics. Developing GIS portal for sharing geo-spatial database.	aczisc.dal.ca	Michael J.A. Butler (Director) michael.butler@dal.ca

4.4 Progress the development of an integrated decision making framework for ICZM (ToR d)

During the discussions of this WG in 2008, it was recognised that ICZM decision-making needs to be based on integrated scientific tools and innovative governance frameworks that provide practical, viable and meaningful advice to inform management actions. Such tools include spatial mapping, indicators, governance frameworks (such as participatory action, conflict resolution), and models.

Relevant activities could include bringing together approaches such as risk characterisation (which draws upon all of the tools referenced previously) within a structured and integrated decision-making framework to ensure that problems are adequately formulated and that relevant risks to ecosystem, social, cultural, and economic components are taken into account with appropriate governance and accountability mechanisms. Relevant activities in the ICES countries include:

4.4.1 Risk Based Decision-Making in Canada

In Canada, provincial and territorial jurisdictions have the primary mandate for land-based coastal management. The federal role in coastal management is to inform relevant jurisdictions in their decision-making processes, the CoE (Centre of Expertise) on coastal management is focusing its efforts in the development of ecosystem-based frameworks and tools in relation to cumulative effects. It is leveraging products and practices presently developed for large oceans management areas. This is being achieved via a network of regional, national and international experts validating approaches and also contributing to the overall knowledge base of coastal management practices.

In terms of an update of ongoing activities, a risk analysis decision-making paper is presently under review in terms of its applicably to ICZM (Figures 4.4.1.1 and 4.4.1.2). In addition to having defined ecologically and biologically significant areas, social, cultural, and economic overviews are being developed for several oceans and coastal management areas. As a means to validate risk-based decision-making, a compendium of ecosystem vulnerabilities, geo-spatial analysis tools, a definition of ecosystem zone of influence and regional vulnerabilities profiles are being piloted in relevant coastal zones.

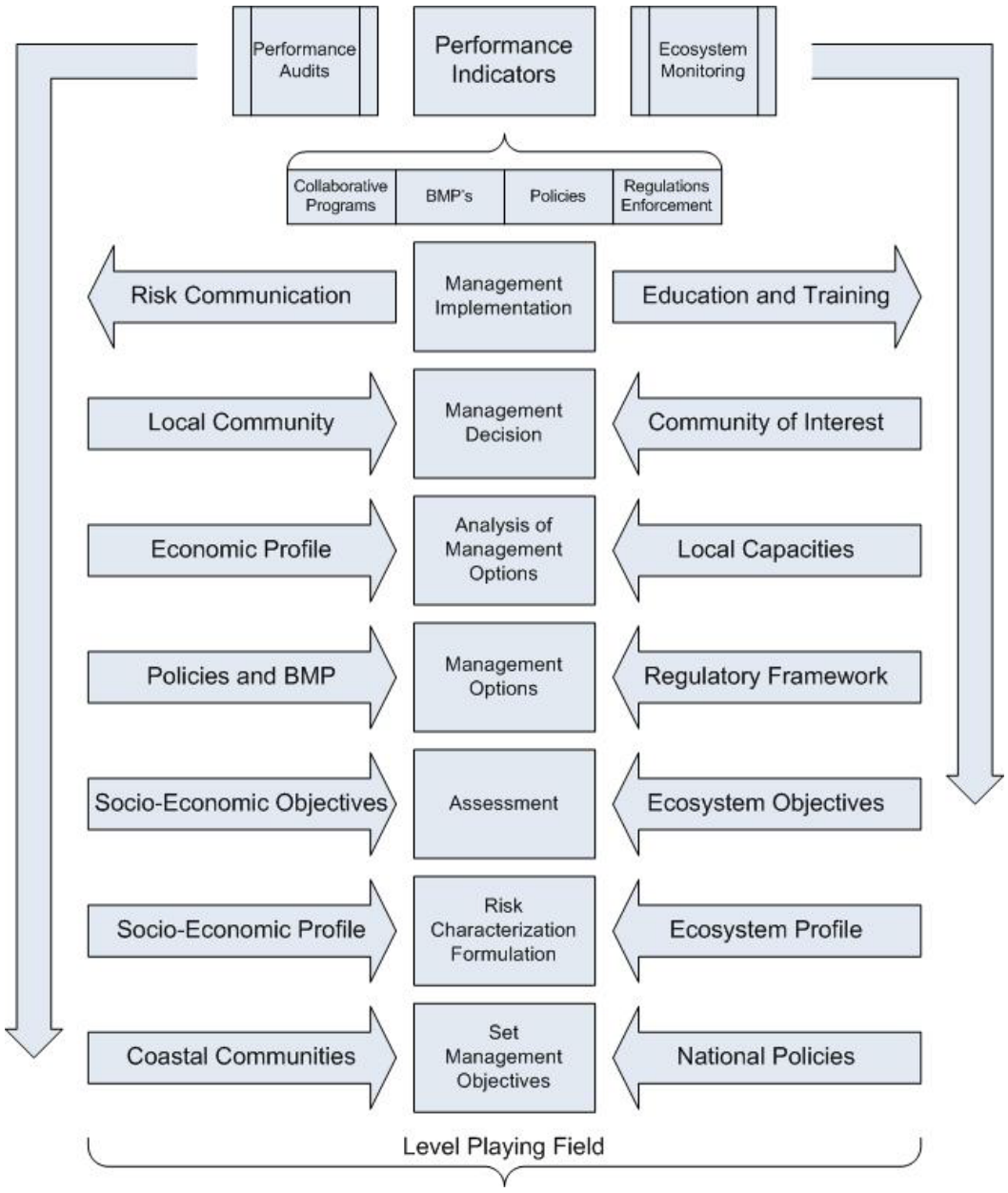

Figure 4.4.1.1: The Risk Assessment Process Conceptual Models

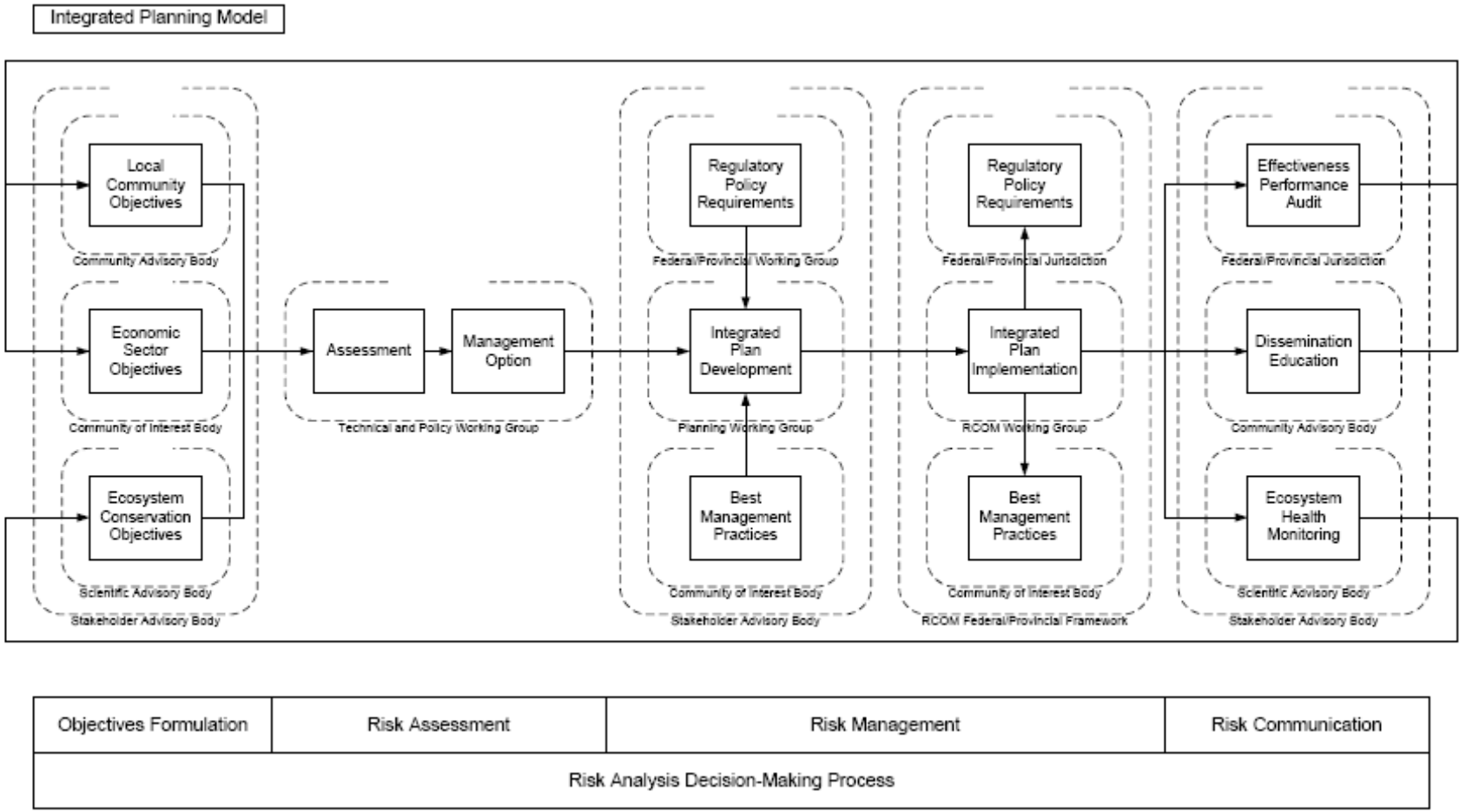

Figure 4.1.1.2: Risk Analysis Decision Making Framework Conceptual Models

4.4.2 The Scottish Sustainable Marine Environment Initiative (SSMEI)

The Scottish Sustainable Marine Environment Initiative (SSMEI) was instigated by the Scottish Government in November 2002. Its principal aim is to develop new management framework options for the sustainable development of Scotland's marine environment. These options should embrace the concept of the ecosystem-based approach to protection measures, and is being tested through the implementation of a number of pilot management schemes. An important aspect of the project is that it runs across several government agencies within Scotland and links directly with other relevant UK initiatives. The SSMEI is a unique and innovative approach to develop an overall marine planning framework for Scotland.

The SSMEI comprises 3 phases:

- Phase I - Management framework options design and pilot project scoping;
- Phase II - Management framework creation and the inauguration of pilot projects; and
- Phase III - Pilot project implementation.

The SSMEI is designed to build upon and complement existing UK marine initiatives. The project aims to gain an understanding of the nature, value, and management needs of Scotland's marine environment and to identify alternative management approaches, with a view to ensuring new management initiatives and possible future legislation result in a truly sustainable framework.

The initiative has entered its third and final phase, with four pilots now established in Berwickshire, Clyde, Shetland and the Sound of Mull, which have been designed to investigate different aspects of Sustainable Marine Management. Topics included are spatial planning, habitat mapping and conflict resolution.

The Shetland project, which started in January 2006 and will run until April 2010, aims to develop an integrated and coordinated Marine Spatial Plan (MSP) for Shetland, published in two parts; the policy framework and the Marine Atlas. The MSP provides guidance for the placement of different marine activities to improve marine management and reflects extensive public involvement, consultation and consensus. The MSP underwent a public consultation on the first draft and the many comments received have added significant value to the MSP development process. "Part One: The Policy Framework" has been recently re-drafted as an interim draft, but "Part Two: The Marine Atlas" (the hard copy of the GIS layers) has not yet been amended. These drafts will be tested until May 2009 with its trial implementation by marine planners, regulators, communities and developers. The feedback will be collated to determine whether it adds any value to the current management regimes. This document is designed to guide all marine users in the placement of existing and proposed activities, operations or developments. The following steps aide navigation through the Policy Framework document, where there are two hierarchies of policy to read and supplementary maps to consult.

Step 1: The General Development policies provide you with the general constraints that should be considered when using the marine and coastal area.

Step 2: The next hierarchy of policy is more detailed advice appropriate to the sector / type of activity, providing specific guidance on the placement of the development / activity proposal.

Step 3: Reference to the maps in the Marine Atlas (Part Two of this document) that provide advice on important features surrounding the area of interest. Spatial information is also available on Google Earth™ or on certain other Geographical Information Systems (GIS)

Step 5: Ensure familiarity with other statutory policies that may apply to the activity, which are detailed in each section of this report (including Shetland Islands Council's Interim Policy for Marine Aquaculture (2007), Works License Policy).

Forthcoming Sub-Area Marine Spatial Plans: During the creation of a remit for the Shetland SSMEI pilot, it was agreed that a set of more detailed local plans will be produced relating to marine systems where competition for resources exists. One sub-area Plan will be developed for Fair Isle where the local community desire statutory objectives for the surrounding marine and coastal environment (i.e. it considers specific community aspirations). Another sub-area Plan will be established for an intensively used area on the Shetland mainland, to explore options for development potential and aspirations for existing industry in an area. It is anticipated that these plans would need to be developed where the conflicts and issues require a more focused set of objectives and targets compared to this 'overarching' Plan. It is also likely that the different scales of Plan will highlight implications for detail of data and therefore resource planning in other areas. Whilst these policies will be applied to future developments and uses, the aspiration is to adapt existing uses and management to these too. Pressure points have been, and will continue to be mapped during the production of this Plan. Subsequent application of this will involve a review of current practices that guide development and/or activities in these high pressure areas.

Therefore in summary this policy document enables developers to identify locations, prior to the submission, of plans that would be considered unsuitable for a particular development or where a development would be looked on favourably by the regulators. This approach should lead to reduced delays and costs. More information and documents can be found at: http://www.nafc.ac.uk/SSMEI.aspx

In contrast to the Shetland scheme, the aim of the Berwickshire pilot is to promote and encourage more sustainable management of the marine environment through enhanced community engagement and participation and initiatives. Examples of such initiatives include: an action plan to develop a sustainable Berwickshire fishery; not only operating within environmental limits, but also economically healthy and integrated harbour management to help the diversification of harbour activities into the tourism market.

The Clyde pilot is concentrating on improving the management of marine and coastal resources in UK waters, which has evolved along largely sectoral lines, resulting in a plethora of legislation. As new and increasing pressures on marine resources develop, it is increasingly recognised that the existing system for formulating decisions in the marine environment needs refinement or modification to make the process more effective. The SSMEI Clyde Pilot will be investigating current decision-making processes and testing new approaches, underpinned by a local Marine Spatial Plan.

4.4.3 Belgium: Combining sea and coastal planning in Europe – C-Scope

Given the current and projected pressures facing the coast from development and climate change, and the potential competition for space between sectors such as shipping, fishing, recreation and renewable energy, there is a clear need for a more integrated approach. Fundamental to the success of ICZM is a seamless approach to planning which links the terrestrial and marine environments.

The vision of C-SCOPE project (partners: the Belgian Coordination Centre and The Dorset Coastal Forum) is to provide practical case studies of how this can be achieved to the benefit of local economies and the environment through a 'bottom-up' approach. As the project just started in the beginning of 2009, there are no concrete developments yet but the approach has already been defined.

The project aims, through case studies involving both field mapping and new technologies, to illustrate planning frameworks at regional, sub-regional and local scales. These will assist a wide range of users in achieving the cross-cutting principle of sustainable development as well as improving the relationship between coastal protected landscapes and their marine counterparts.

A new coastal zone planning framework is insufficient without the tools to apply it and the project will develop an innovative planning tool called 'Coastal Explorer' which will, provide relevant information to make informed decisions. Finally the project will illustrate the most successful models for long-term stakeholder involvement and the effective dissemination of coastal information.

4.4.4 SPICOSA Project

The EU SPICOSA project (2007–2010) aims at integrating science and policy through a Systems Approach Framework that allows the assessment of different policy alternatives. Based on a system approach, a multidisciplinary assessment framework is being developed with a balanced consideration of the Ecological, Social and Economic sectors (ESE) of Coastal Systems. This System Approach Framework (SAF) is being used to explore the dynamics of Coastal-Zone Systems and potential consequences of alternative policy scenarios. Achieving this objective will require a restructuring of the science needed to understand the interactions between complex natural and social systems at different spatial and temporal scales including overall social and economic evaluation of alternative policies. The SAF is organized into four major Steps: Design, Formulations, Appraisal, and Output. In total, 18 study sites in Europe are implementing each Step of the SAF, in relation to different policy issues, such as tourism, recreational fishery, commercial fisheries and aquaculture, and eutrophication. Feedback is provided towards developing a generic SAF. Ecosystem goods and services were identified and mapped as part of the initial Design Step of the SAF. In the following Steps, the software packages EXTEND and PCRaster are being applied to allow for temporal and geospatial modelling of ecological, economic, social and cultural components of the ecosystem, to provide scenario based evaluation of policy options for decision support in ICZM.

SPICOSA's use of the SAF is to enhance the Coastal Zone System Feedback Loop as shown in Figure 4.4.4.1 below. This includes facilitating integrated stakeholder engagement at the local, regional and national level and furthermore, to develop guideline, manuals and teaching material on implementation of the SAF approach and ESE assessments in ICZM in EU and neighbouring countries.

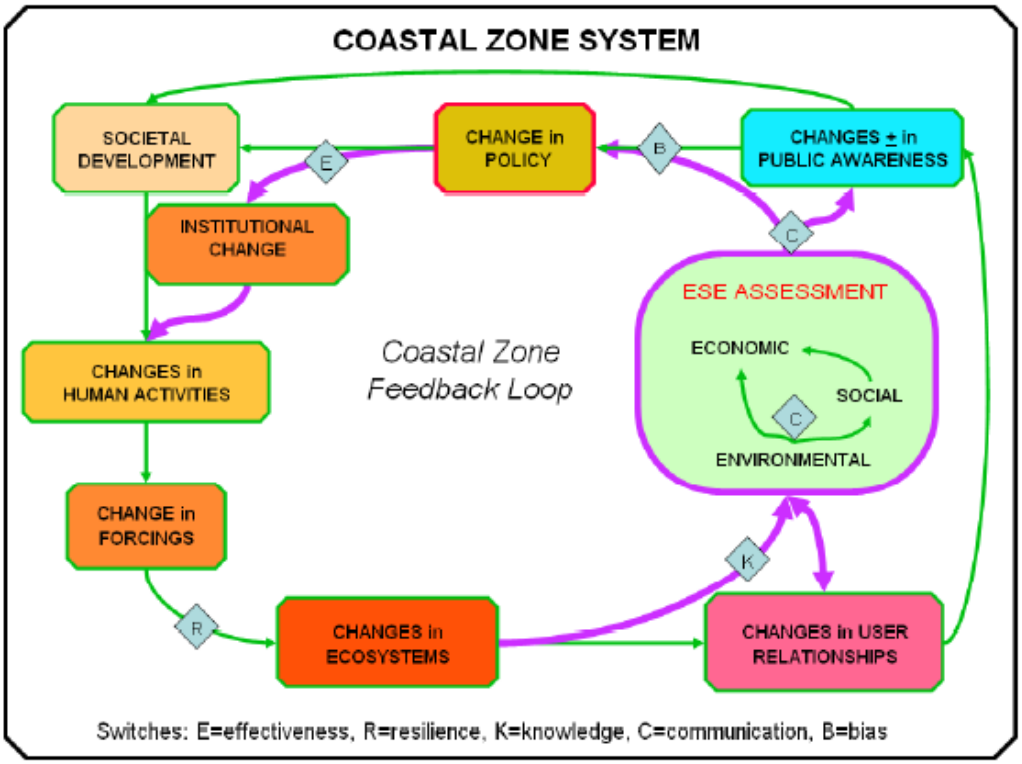

Figure 4.4.4.1: The SPICOSA Coastal Zone System Feedback Loop. The Ecological-Social-Economic (ESE) Assessment box represents the central activity of 18 SPICOSA study sites. The small diamond boxes represent critical threshold constraints on the interactions between components of the system. These constraints need to be understood if the effects of various policy scenarios are to be accurately forecast, and distinguished. For more information see URL: www.spicosa.org.

During the discussions the group reflected that Europe does not have a well-established decision-making-framework for ICZM. The group considers that structured approaches such as the Risk Characterization Framework presented by Canada may be a valuable contribution to harmonizing the implementation of ICZM in ICES countries. In addition, it was reflected on that European definitions of ecosystem based approaches tend to be primarily focused on ecological and physical factors, where North America considers it within a human-ecological context.

WGICZM recommends that:

- ICES promote the adoption of a harmonized, structured decision-making framework for ICES Member States. By continuing to monitor existing and emerging decision-making tools and frameworks, WGICZM will be able to contribute to this recommendation and provide advice to ICES.
- It is more relevant to discuss decision-making frameworks in isolation within this ToR, after discussions addressing the use of tools within this ToR.

4.5 Evaluate the usefulness of assessing ecosystem goods and services in ICZM (ToR e)

Out of the discussions concerning assessment frameworks in 2008, WGICZM proposed to investigate the usefulness of assessing ecosystem goods and services as a tool to link the ecosystem approach to management, the assessment of human impacts and subsequent decision making. Evaluating ecosystem goods and services, particularly in economic terms, is a valuable way of communicating the importance of environmental sustainability to the public. Having said this, it is important to recognize that there are many non-market values that should be assigned to ecosystem goods and services (i.e. social, cultural, existence, intrinsic, spiritual, option). Assigning a tangible value to ecosystem goods and services, which can be approached from many disciplinary perspectives, facilitates discussion and evaluation of management actions that are based on quantifiable costs and benefits.

It is important to note that there is an element of risk involved when attempting to communicate quantified values for ecosystem goods and services to decision-makers in that it may lead to the belief that they can be substituted by technological advances or anthropogenic substitutes. This corresponds to the spectrum of weak and strong sustainability, where strong sustainability is based on the premise that human and natural capital are complementary but not interchangeable.[8]

A project working to apply the ecosystem goods and services approach within the frame an integrated assessment approach to coastal change is the German research cluster "Coastal Futures". As a part of this project a range of disciplinary studies is currently aggregated into an ecosystem service approach based on the definitions of the Millennium Ecosystem Assessment. Aim is to evaluate to which degree the ecosystem goods and services approach can be used as a tool to implement an ecosystem approach to management. A presentation highlighted recent work in progress of this project focussing on changes in ecosystem services related to construction and operation of offshore wind farms. For local stakeholders discussing offshore wind farms, cultural ecosystem services related to intangibles, e.g. beauty of landscape, inspiration and wilderness, ethical reasoning for nature conservation play an important role in this example. Therefore services which depend on individual values and perceptions and which cannot be valued in e.g. monetary terms can form an important element of decision making.

WGICZM recommends:

- that ICES takes the position that the assessment of ecosystem goods and services should be based on strong sustainability principles (see Turner *et al.*, 2001).
- that the process of assessing ecosystem goods and services can provide valuable contributions to the decision-making process but should be used in conjunction with other tools. In this context ToR e will now include assessment of all tools related to ICZM.

[8] E.g. Turner, RK, Bateman, IJ and Adger, WN. 2001. Ecological Economics and Coastal Zone Ecosystems' Values: An Overview. Studies in Environmental Economics Vol 3, Kluwer Academic Publishers, London.

4.6 Report on progress on catchment-coast fluxes in the ICZM management plans for ICES countries (ToR f)

Based on the discussion last year on catchment-coast-ocean interaction, the Land-Ocean Interactions in the Coastal Zone (LOICZ) project was invited to present the status of their work for the WG. LOICZ is a core project of the International Geosphere-Biosphere Programme (IGBP) and the International Human Dimensions Programme on Global Environmental Change (IHDP). LOICZ focuses on how humans are supported by the coastal system, how their activities impact upon it, and what policies and practices will be required to ensure its sustainability. Research on the biogeochemical, physical and human dimensions of coastal change is being carried out in LOICZ within five Scientific Themes defined and described within the Science Plan and Implementation Strategy[9]. It became obvious, that all of the LOICZ research themes are highly relevant to the objectives of WGICZM. These scientific themes are:

1) Vulnerability of Coastal Systems and Hazards to Society,

2) Implications of Global Change for Coastal Ecosystems and Sustainable Development,

3) Human Influences on the River Basin Coastal Zone Interactions,

4) Biogeochemical Cycles in Coastal and Shelf,

5) Towards Coastal system Sustainability by Managing Land-Ocean Interaction.

Specific challenges that LOICZ is tackling are interactions between impacts of local/regional pressures versus global drivers and pressures as well as combining natural and social sciences with stakeholder consultations. All of the above is highly relevant for the objectives and terms of reference of WGICZM. Therefore the discussion following the presentation resulted in the following recommendations:

- Report on results and progress of LOICZ activities in ToR a, together with the reporting on international policy activities and other ICES WGs;
- Invite LOICZ representatives to future meetings of WGICZM;
- Explore, through regular exchange opportunities, joint actions between WGICZM and LOICZ.

None of the European WG members reported on the existents of ICZM management plan for their country and therefore no report on catchment-coast fluxes related to ICZM management plan. In principle there exists no ICZM management plans in most ICES countries for the moment and the ToR, as it is formulated needs to be rephrased. Regarding Canada, watershed management and monitoring is a mostly a function of provincial jurisdiction with some federal responsibilities in relation to aquatic habitat and pollution control. Both federal and provincial jurisdictions administer a variety of programs spanning from stewardship activities, ecological research, compliance, watershed planning and to water quality classification. Watershed management also includes land-based activity planning and may include estuaries and limited coastal zone. Depending on the provincial jurisdictional structure, the management of recreational and some commercial freshwater fisheries have also been delegated to provincial authorities.

[9] http://www.loicz.org/imperia/md/content/loicz/science/science_plan_and_implementation_strategy

WGICZM further recommends:

- That this ToR should continue but be more broadly focused on coastal system sustainability, based on integrating human ecological systems in relation to Land-Ocean Interactions.

This WG recognises that there is often a gap between policy formulation in Europe and how coastal management is implemented and integrated. This linkage is more advanced in Canada, although some developments to further integrate land-based activities and the coastal environment is still progressing.

Therefore WGICZM recommends:

- That WGICZM should provide advice on the integration of all the issues highlighted in the ToRs of this WG, to be addressed in ToR f.

5 Other Items

WGICZM recommends that an ICES symposium on ICZM be organised in 2012. This symposium will follow up of the 2007 ICES sponsored symposium on ICZM; thematic areas of this conference could reflect the ToRs of WGICZM. The symposium would also be an ideal platform to present the results of several international projects that are ending before 2012.

ICES Annual Science Conference 2010. WGICZM still supports the 2008 proposed theme session on the risk of failing in integrated coastal zone management. Conveners: Roland Cormier (Canada), Beatriz Morales-Nin (Spain), Josianne Strottup (Denmark).

Regarding the request formulated by the Fjord ecosystems network that WGICZM recommends this as ICES working group. We consider that this is a positive initiative to understand the ecology of Fjordic ecosystems and may be relevant to this WG. However, the information provided by the network does not reflect the objectives and goals that an ICES working group requires.

Annex 1: List of participants

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Annex 2: Agenda

March 24

8.45 Transport from hotel Lindenhof to GKSS, convene at GKSS

- Welcome (Beatriz Morales Nin, Chair);
- Housekeeping and support arrangements (Andreas Kannen);
- Introduction of participants (chair + members);
- Agenda approval
- Review of Terms of Reference, Designation of Reporters, Report layout (chair + members);
- ToR a) different participants present status and progress on activities of relevant ICES Working and Study groups to identify information pertaining to coastal zone an evaluate this information relative to ICZM needs and review progress from the EU and IOC;
- ToR b) update and report on ICZM activities in different ICES countries including information on initiatives towards integrated governance on the CZ
- Collate different inputs into the report.

18.00 End of meeting, transport from GKSS to hotel Lindenhof

March 25

8.45 Transport from hotel Lindenhof to GKSS, convene at GKSS

9:00–12:00

- ToR e) evaluate the usefulness of assessing ecosystem goods and services in ICZM (including presentation of Andreas Kannen and colleagues on ecosystem goods and services in the German project Coastal Futures);
- ToR c) monitor and report results generated from larger projects that are directly relevant to ICZM needs;

13.30–18.00

- ToR f) report on progress on catchment-coast fluxes in coastal management plans of ICES countries;
- Presentation about LOICZ activities and science (Juergen Weichselgartner, Senior Science Coordinator, LOICZ IPO);
- Discussion about overlaps and synergies between LOICZ and ICES WGICZM

18.00 End of meeting, transport from GKSS to hotel Lindenhof

March 26

8.45 Transport from hotel Lindenhof to GKSS, convene at GKSS

9.00–12 h

- ToR d) Progress the development of an integrated decision making framework for ICZM;

13:30–18:00

- Welcome and presentation: Franciscus Colijn, Director at Institute of Coastal Research at GKSS
- Collate different inputs into the report, work in drafting groups;
- Days Progress distributed for reading;

18.00 End of meeting, transport from GKSS to hotel Lindenhof

March 27

8.45 Transport from hotel Lindenhof to GKSS, convene at GKSS

- Work in drafting groups, collate the report and print out Draft 2 and distribute for reading;
- Rapporteurs of the different ToR pass draft recommendations and 2009 ToR proposals to be discussed in forum;
- Convene to discuss the draft report, final modifications of draft.
- Next year venue and dates.

End of 2009 meeting.

Annex 3: Terms of Reference for 2010

The **Working Group on Integrated Coastal Zone Management** [WGICZM] (Chair: B. Morales-Nin, Spain) will meet at IMEDEA, Majorca, Spain from 9–12 March 2010 to:

a) update and report on activities of relevant ICES Working and Study groups to identify information pertaining to the coastal zone and evaluate this information relative to ICZM needs and to monitor progress on policies and programmes in the UN, EU, LOICZ and ICES member countries;

b) update and report on ICZM activities in different ICES countries including information on initiatives towards integrated governance in the CZ;

c) continue to monitor and report results generated from larger projects that are directly relevant to ICZM needs;

d) progress the development of an integrated decision making framework for ICZM;

e) continue the assessment of tools related to ICZM;

f) continue to report on progress on catchment-coast fluxes in the ICZM management plans of ICES countries, but be more broadly focused on coastal system sustainability based on integrating human ecological systems as they relate to Land-Ocean Interactions. This ToR should also provide advice on the integration of all the issues highlighted in the ToRs of this WG, to be addressed in ToR f.

WGICZM will report by 21 April 2009 for the attention of SCICOM and ACOM.

Supporting Information

PRIORITY:	In order to maintain and improve the quality of ices advice, the specific requirements for scientific advice in support of client initiatives on iczm need to be evaluated. in response to demands for ecosystem-based advice, ices has adopted an ecosystem-based approach. including the coastal zone would allow ices to provide better holistic advice. consequently these activities have high priority.
Scientific justification:	Many ICES Study and Working groups address specific coastal zone issues. Others do not include coastal zone issues in their work, but have the expertise to, or could, with added expertise, address these issues. All the information being generated needs to be compiled and analysed to ensure consistent and integrated advice. The ecosystem based approach to the management of human activities as the leading principle for integrated coastal zone management implies that knowledge on the key ecosystem processes and properties in the coastal zone will be the core of the information ICES will be able to add into the process of ICZM. Important components include the valuation of coastal ecological niches, specific habitats, identification of essential and critical species and habitats particular to coastal areas, and development of EcoQOs specifically for the coastal zone. This work will contribute directly to the applications of emerging and present coastal directives (e.g. EU-WFD; EU-ICZM, Marine Strategy) and other local or trans-boundary management issues within ICES Member Countries.
Resource requirements:	New experts have been recruited during the past two years and there is a need to engage experts from USA and other ICES countries involved in ICZM and not participating actively within the WG.
Participants:	ICES Member Countries working with coastal zone issues and 1–2

	socio-economic experts also involved with ICZM. The Group is normally attended by some 10–14 members and guests.
Secretariat facilities:	None.
Financial:	No financial implications.
Linkages to advisory committees:	There are obvious direct linkages with ACOM.
Linkages to other committees or groups:	SCICOM and several Working Groups within this committee, in particular Mariculture related groups.
Linkages to other organizations:	EU, OSPAR, HELCOM, LOICZ.

Annex 4: Recommendations

Recommendation	For follow up by:
1. The WGICZM recommends that, in accordance with the ICES Science Plan (2009–2013), ICES take into serious consideration the importance of emphasizing to the Member States the relevance of ICZM within ICES and the existence of this WG and its ability to provide related advice (See Section 3).	SCICOM
2. WGMHM has made a request for input from WGICZM with regard to MSP. After some discussions in the group it was decided that a list of questions/issues to be addressed by WGMHM was proposed (See ToR a): a) The working group recommends that data translation and visualisation summarisation approaches be investigated. i. In addition to habitat mapping, these should include other significant ecosystem components such as spawning/nursery grounds, migration routes and key mating/feeding grounds that are vulnerable to human activities. ii. In addition, it would also include mapping of the intensity of human activities taking into account social, cultural and economical components. iii. The maps should illustrate the connectivity and coherence between land/sea interactions as it relates to rivers, coast and sea. b) The working group recommends the development of geo-spatial/temporal analysis tools that combine ecological and socio-economic modelling and assessment, taking into consideration existing relevant legislations, indicators and management action thresholds. c) The working group recommends the development of geo-spatial visualisation tools for interactive policy scenarios.	WGICZM/WGMHM
3. WGICZM suggests that a mutual ICES WG meeting be organized with WGMHM, as a mini-workshop (in Mallorca) (See ToR a).	WGICZM/SCICOM
4. ICES WGICZM recommends that the EU ICZM Working Group takes into consideration its recommendations in its advice to the EU ICZM Expert group, specially on possible policy options for a follow-up instrument(s) to the EU ICZM Recommendation (See ToR a).	EU ICZM WG
5. WGICZM recommends that a representative from the "Our Coast" project be invited to participate in the working group (See ToR c).	WGICZM
6. WGICZM aims to assist SCICOM to promote the adoption of a harmonized, structured decision-making framework for ICES Member States on CZM. By continuing to monitor existing and emerging decision-making tools and frameworks, WGICZM will be able to contribute to this recommendation and provide advice to ICES (See ToR d)	SCICOM
7. The WGICZM recommends that ICES takes the position that the assessment of ecosystem goods and services should be based on strong sustainability principles as in Turner et al. 2001[10] (See ToR e).	SCICOM

[10] Turner, RK, Bateman, IJ and Adger, WN. 2001. Ecological Economics and Coastal Zone Ecosystems' Values: An Overview. Studies in Environmental Economics Vol 3, Kluwer Academic Publishers, London.

8. WGICZM recommends that an ICES symposium on ICZM be organised in 2012. This symposium will follow up of the 2007 ICES sponsored symposium on ICZM; thematic areas of this conference could reflect the ToRs of WGICZM. The symposium would also be an ideal platform to present the results of several international projects that are ending before 2012.	SCICOM
9. WGICZM still supports the ASC theme session proposed in 2008 on the risk of failing in integrated coastal zone management. Conveners: Roland Cormier (Canada), Beatriz Morales-Nin (Spain), Josianne Strottup (Denmark)	SCICOM

Annex 5: Update and report on ICZM activities in different ICES countries including information on initiatives towards integrated governance on the CZ (ToR b)

5a. BELGIUM (updated in 2009)

In the context of ICZM, a flexible definition of the zone which compromises both sides of the Belgian coastline: sea and land, is often used. The coast comprises the territory of the coastal and polder (hinterland) municipalities and demarcated on the by 12 mile zone. In the context of legislation, the line between land and sea is formed by the baseline or the average low water line. The Belgian Coast is a densely populated area with important economic and tourist activities. The coastline comprises broad sandy beaches that are mostly connected to a narrow dune belt. Inland, there lies a flat and vast polder landscape. The extensive road system provides easy and efficient access to the coast from a vast hinterland comprising cities. The built- shoreline and linear traffic infrastructure makes the coast resemble a narrow, unbroken, conurbation, only sparsely interrupted by empty spaces. On the seaward side of the coastal zone, the Belgian part of the North Sea, has a maximum width of about 65 km and extends about 87 km the coast. Despite its small size, the North Sea of the Belgian coast is characterised by several valuable habitats. This in part has to do with the presence of a complex system of sandbanks.

ICZM Policy Activities

In Belgium there is no specific strategy for ICZM, but Belgium tries to integrate the ICZM approach in existing instruments. A first governmental structure, which was important for realization of a sustainable and integrated management of the coast, was the Technical Commission North Sea (1990). Its main objective was the preparation and implementation of decisions that were taking in international treaties in the marine environment. Under the impulse of several NGOs, the Flemish minister for environment set up interministerial cooperation in 1994. This a first attempt for co-ordination and consultation of sector crossing activities with regard to the coastal zone. The co-ordination structure for International environmental policy (CCIM) was set up in 1995. The technical commission North Sea was reformed into the steering group North Sea and oceans and is a part of the CCIM-structure, which has a permanent character. As a sequel of the TERRA-Coastal zone project, the Coordination Centre for integrated coastal zone management (ICZM) was established in 2001. The partners of the Coordination Centre are the Province of West Flanders, acting on the basis of its decrial task to target specific zones; the Flemish authorities, two departments of which act as partners in the Coordination Centre. (1) the Department of Mobility and Public Works, Agency for Maritime and Coastal Services, Coastal Division; (2) the Department of the Environment, Nature and Energy, Agency for Nature and Forests, Coastal zone service and the Flanders Marine Institute (VLIZ). In September 2007, these partners signed a cooperation protocol at the Coordination Centre. By doing so, they confirm that they will use the Coordination Centre as their primary instrument for accomplishing sound coastal management The global goal is to stimulate and promote the sustainable and integrated management of the Belgian coastal zone. The Coordination Centre is the prime point of contact for everyone in the coastal zone that is involved in cross-sector issues. To accomplish this mission, the Coordination Centre is to pursue three strategic objectives:

a) Cooperating in implementing the Recommendation of the European Parliament and the Council of 30 May 2002 concerning the implementation of integrated coastal zone management in Europe;

b) promoting the integration of planning and policy in the coastal zone;

c) creating a basis for integrated coastal zone management.

While implementing the objectives, the Coordination Centre will never replace the competent authorities. The activities are determined and approved annually in consultation with all partners. Since 2003, Belgium appointed a minister for the North Sea. This minister has the responsibility for the political coordination between the different actors that are involved in the management of the Belgian marine area. For a better coordination of the actions of the Belgian state on sea, in 2003 the "Coastwatch" was established. In a later stadium (2005), the Flemish government participated in the Coastwatch as an equal partner. In 2003, the minister of the North Sea had an objective to install a plan for a sustainable management of the North Sea. In a first phase, new rules for the sand extraction and electricity production were implemented. In a second phase, 5 marine areas were protected in the framework of the habitat and bird directives. Three Bird Directive areas and Two Habitat Directive areas are being designated. By these measures, the EU Bird– and Habitat Directive have been fully implemented.

Water Framework Directive

The Water Framework Directive aims at the protection of all water bodies (including coastal waters) in Europe and must have achieved a 'good ecological status' in 2005. According with the EU Water Framework Directive, Flanders is divided into 11 basins. The filling-in river basin plans goes by an equally process for the 11 basins but coastal areas are not included in these river basin plans. The project REFCOAST aims to derive a typology, reference condition and classification system for the Belgian coastal waters in the framework of the objectives set by the European Water Framework Directive (WFD). For every determined surface water type (including coastal waters), a 'biological' reference condition needs to be determined. This reference should be based on a good ecological status of the surface water, categorized by their biological, hydro-morphological and physico-chemical condition. The project combines a general overview of the Belgian coastal and marine jurisdiction and the status concerning implementation of the WFD with a study of the availability of data and the delimitation of a typology, reference condition and classification of the coastal waters. The results of the project will be of direct importance to policy makers in charge of the implementation of the WFD for Belgium.

Research project: Combining Sea and coastal planning in Europe – C-Scope

The coastal zone is a particularly dynamic, productive and yet vulnerable environment which is subject to many competing demands. Planning for the coast has, however, suffered from a lack of joined-up thinking. The partners of the Interreg project C-Scope (Provincie West-Vlaanderen (BE) acting for the Coordination Centre on ICZM in Belgium and Dorset County Council (UK) acting for Dorset Coast Forum) have been at the forefront of national and European policy developments to promote more integrated management of the coastal land and waters and the concept of 'marine spatial planning'. The vision of C-SCOPE is to provide practical case studies of

how this can be achieved to the benefit of local economies and the environment through a 'bottom-up' approach supported by cost-effective partnership working.

5b. CANADA (updated in 2009)

Canada has the longest marine coastline (243 792 km) in the world with almost one-quarter of its population living in coastal communities. The area of its territorial seas is two-thirds of the landmass.

Key Issues for ICZM in Canada:

- Impacts on the economies of coastal communities.
- Residential development and recreational and tourism use of the coastal zone are often in conflict with mariculture and traditional fishing uses.
- Land-based sources of pollution (e.g. nutrients and contaminants) and land use practices (e.g. forestry and agriculture) affecting the coastal zone.
- Impact of offshore oil and gas exploration, development and production activity.
- Energy extraction, wind and tide.
- Sea-level rise, erosion, flooding.
- Invasive species.
- Marine transport and infrastructure.
- There are a number of obligations resulting from international agreements with respect to biodiversity and endangered species that are common to all ICES member countries.

ICZM Policy Activities

Canada's Oceans Act, passed in 1997, gave the minister of the Department of Fisheries and Oceans (DFO) the mandate to facilitate an integrated approach to the management of activities in the oceans and along our coasts. This means incorporating ecosystem-based, social, economic, and cultural considerations into decision-making processes through collaborations with affected and relevant interests.

Activities relating to integrated management in Canada were given a higher priority in March 2005 when the government committed "to move forward on its Oceans Action Plan (OAP) by maximizing the use and development of oceans technology, establishing a network of marine protected areas, implementing integrated management plans, and enhancing the enforcement of rules governing oceans and fisheries, including rules governing straddling stocks." The OAP articulates a government-wide approach to reach sustainable development. Fundamental to this initiative are new oceans governance arrangements, including integrated management, as wells as ecosystem science to improve the management of the marine environment.

The main goal for coastal zone management in Canada continues to be the sustainable use of aquatic resources through a sustainable fisheries management framework. However, the application of the precautionary approach and integrated ecosystem-based planning are presently at the forefront with a number of current management and advisory issues being addressed as they relate to the coast.

The establishment of five priority Large Ocean Management Areas (LOMAs), within which DFO is applying an integrated approach to management, represents a

significant step forward in achieving Canada's objective of improved coastal zone management. This initiative was in response to Phase I of the OAP and the LOMAs represent high-priority management areas within Canada's territorial waters: Pacific North Coast, Beaufort Sea, Gulf of St. Lawrence, Eastern Scotian Shelf and Placentia Bay/Grand Banks (Canadian Science Advisory Secretariat (CSAS) SAR 2007/010; http://www.dfo-mpo.gc.ca/csas/Csas/status/2007/SAR-AS2007_010_E.pdf). The establishment of these LOMAS included a number of scientific assessments and the development of approaches to formulate objectives against which ecosystem status and management success can be measured.

The LOMA initiative included producing the following elements:

- Ecosystem Overview and Assessment Reports (EOARs) which are comprehensive descriptions of the knowledge base which present the current scientific understanding of the structure and function of the ecosystem.
- Lists of the Ecologically and Biologically Significant Areas (EBSAs) and Ecologically Significant Species and Ecologically Significant Community Properties (ESS/ESCPs) which represent a high ecological or biological significance and require a greater-than-usual degree of risk aversion in management of activities which can affect them.
- Conservation Objectives (COs) which are science-based objectives related to the status of the non-human components of the ecosystem (CSAS PS 2007/001;http://www.dfo-mpo.gc.ca/csas/Csas/Proceedings/2007/PRO2007_001_B.pdf).

Canada is committed to moving forward and is active on a number of initiatives relating to coastal zone management. The coastal zone is considered as the highest interaction point between land-based activities and the local aquatic ecosystems. In addition, the coastal zone is a significant contributor to the economic prosperity supporting a broad base of sectors. On the other hand, it is the zone where aquatic ecosystems are the most vulnerable to pressures caused by human activities where management lies within a complex jurisdictional backdrop.

Canada has established a Centre of Expertise on Coastal Zone Management with the objective of clarifying the Federal, Provincial and Territorial roles leveraging partnerships among jurisdictions, economic sectors of activity and coastal communities. Given that the primary role of the Federal Government in coastal management is related to informing relevant jurisdictions in their decision-making processes, the CoE will focus its efforts in the development of ecosystem-based frameworks and tools with particular focus on managing for cumulative effects. The CoE is developing risk-based decision making processes and governance by drawing on existing international practices, concepts and frameworks. It is drawing on the Driver Pressure State Impact Response (DPSIR) standards as well as the Pathway of Effects (PoE) approaches to risk characterization. Selected coastal pilots are contributing to the development of geo-spatial tools for identifying land-marine interactions points, ecosystem vulnerabilities and for integrating of social, cultural and economic values in decision-making and land-based planning processes.

There is recognition of the need to adapt the approaches and knowledge from the LOMA initiative to the finer scale of coastal and inshore areas. EOARs have already been completed for selected priority coastal areas and Coastal Management Area (CMA) pilot projects are being considered (CSAS PS 2007/025). This task is a challenge for both science and management given the extent and diversity of human ac-

tivities in the coastal environment as well as the overlapping jurisdictions of municipal, provincial, territorial and federal governments.

Ecosystem Research Initiatives (ERI) have been designated in coastal areas (e.g. Northumberland Strait and Strait of Georgia) to develop ecosystem-based advice for integrated management based on strategic scientific research. The development of ecosystem indicators and reference points is ongoing and considered essential to setting and achieving the goals and objectives. These indicators are tied to the identification of EBSAs/ESS/ESCPs and Species-at-Risk, where the intent is to provide for the overall ecosystem function and structure by protecting key ecosystem components. The renewed emphasis on ecosystem-based science and the identification of vulnerable components is expected to provide guidance in establishing monitoring approaches and scientific priorities (CSAS PS 2006/003; http://www.dfo-mpo.gc.ca/csas/Csas/Proceedings /2006/ PRO2006_003_E.pdf).

5c. DENMARK (updated in 2009)

Waiting for political decisions to be realised before update can be published

5d. GERMANY (Updated in 2009)

Germany has a coastline of 3379 km divided roughly into 1300 km along the North Sea and 2000 km along the Baltic Sea. Along the German Baltic Sea coast, the tide is almost absent and the water is brackish. It is a shallow coast with numerous bays, lagoons, cliffs, peninsulas and islands. In contrast, the North Sea coast is characterized by a tidal regime and mainly features tidal flats, islands and marshland.

There is no official definition of the coastal zone in Germany. For terrestrial planning purposes on the local level responsibility generally ends at the mean high tide. The state of Schleswig-Holstein has established a 100-metre inland-protected strip along the coast under its Nature Conservation Act; the state of Mecklenburg-Vorpommern has established a 200 metre wide inland- and a 200 m wide offshore-protected strip under its Nature Conservation Act. Most of the German North Sea coast is protected as National Park. In the most northern part of the North Sea coast in Schleswig-Holstein the waters between the National Park and the 12 sm line are designated as a whale sanctuary. Generally it needs to be noted that the territorial waters are in the responsibility of the regional (Laender) level, except public waterways, especially the access routes to harbours, while the public waterways and the EEZ are managed within the responsibility of the Federal government.

According to the national ICZM strategy the following areas have to be considered in ICZM (BMU: Integriertes Küstenzonenmanagement in Deutschland: Entwurf für eine nationale Strategie für ein Integriertes Küstenzonenmanagement (as from 13 February 2006, see also www.ikzm-strategie.de (German only)):

- the Exclusive Economic Zone (EEZ);
- coastal waters;
- transitional waters in the sense of the WFD;
- in estuaries those waters, which are influenced by the tide;
- on the terrestrial side the adjoining rural counties (Kreise);

- flexible handling of inland boundaries according to the specific problem to be addressed.

Key issues for ICZM in Germany are:

- the development of offshore wind-farms in the EEZ;
- the increase in planned sediment extraction activities in offshore waters;
- the establishment of nature conservation areas in the framework of the EU habitat and bird directive;
- the development of ports and harbours, especially in Hamburg, Wilhelmshaven and Bremerhaven;
- the decline of fish stock due to over-fishing;
- the preservation of tourism as major economic factor for the coastal region
- coastal defence strategies;
- the possible development of inshore and offshore aquaculture.

ICZM policy activities

In relation to coastal management, both the federal government as well as the federal states (Bundesländer) have joint responsibility for most areas of coastal planning issues. The Federal Ministry of Transport, Construction and Housing is responsible for providing national guidelines and coordinating planning policy from which the individual states derive their own planning legislation. This entails that for regional planning, water management, coastal protection, nature conservation and others the federal states establish their own legislative structure and adhering laws, albeit having to be in accordance with the federal legal framework.

Due to increasing activities in offshore and coastal waters, especially planning of offshore wind farms, the federal states extended spatial development and provided spatial plans dealing with human activities and potential conflicts in the territorial waters. According to the Federal Building Act, spatial planning will be introduced for the German Exclusive Economic Zone (EEZ). The formulation of targets and principles for spatial development in the EEZ is currently in preparation. A draft maritime spatial plan and the strategic environmental assessment report have been published in the framework of a public participation in summer 2008. All documents (as well in English) and the statements of agencies and NGOs (in German) have been published at the website of the Federal Maritime and Hydrographic Agency: http://www.bsh.de/en/Marine_uses/Spatial_Planning_in_the_German_EEZ/index.jsp

Hearings took place for the EEZ of the North Sea and the Baltic Sea end of September, early October 2008. Because of the comments a second round of public participation will be started in spring 2009. It is expected that the legal ordinance for the maritime spatial plan will be set into force by the Federal Ministry of Transport in summer 2009.

A very detailed report covering human activities and the institutional setting from the perspective of spatial planning has been elaborated within a research project of the Ministry of Transport, Construction and Housing and the Federal Agency for Housing and Spatial Planning. This has been published in 2006. The results of the research project including recommendations for the national ICZM strategy have been discussed with a wide range of stakeholders and scientists in two conferences,

one in October 2003 and one in February 2005. A final report has been issued during the first half of 2006. Interim results have been published in several conference proceedings.

A national ICZM strategy (www.ikzm-strategie.de, German only) has been prepared in 2005 by the Federal Ministry for the Environment, Nature Conservation and Nuclear Safety. A comprehensive and holistic approach to solving the interlinked problems and the involvement of all actors and responsible authorities are important principles of ICZM. Therefore, the working group "National Strategy" was set up including representatives from the responsible federal ministries, the coastal Laender as well as municipal, environment and economy associations. This was done to ensure that the experience and contributions of the various actors will be reflected in the national strategy. The process was concluded, for the time being, when the federal cabinet dealt with the issue in March 2006. The national strategy was then submitted to the Commission and the results were presented to the interested public at a two-day conference in Bremen.

The report includes a revised stock take of human activities based on the above mentioned research project as well as a description of the legislative setting. With respect to the existing set of tools and activities the national strategy envisages four areas in which further steps should be pursued: further optimization of the set of legal instruments according to the basic ICZM principles, creation of the basis for continuation of the dialog-process, best practice projects and their evaluation and development and application of ICZM indicators.

The federal government as well as the Laender are also involved in the development of the Maritime Policy under the frame of the EU. Discussion concerning the EU Marine strategy has started in expert circles. At the Wadden Sea level a major instrument of trilateral cooperation is the Trilateral Wadden Sea Cooperation. Extending from the traditional nature protection focused approach of the trilateral cooperation; the Wadden Sea Forum focuses on development issues and developed a range of development proposals which are expected to guide future development within the Wadden Sea area. The members of the forum are local and regional representatives from authorities as well as from local communities, NGOs and interest groups. Representatives from the government of the federal states and from the federal government participate as observers in the forum.

With respect to the EU Habitat and Bird Directive the federal states of Schleswig-Holstein, Niedersachsen and Mecklenburg-Vorpommern identified areas in the territorial waters that have been reported to the Commission. Based on the work of the Federal Agency for Nature Conservation, 8 areas in the EEZ with a surface covering almost 950,000 ha were registered as Habitats Directive sites and 2 SPAs with more than 500,000 ha were notified to the Commission as Germany's contribution to the network of protected areas Natura 2000. The SPAs have been designated as national protected areas in the meantime.

On 25 June 2002 the EU Water Frame Directive was implemented into national law. The different national working groups have finished their evaluation on the ecological state of the German coastal waters. Implementing the WFD is a task of the Federal States (Laender). In a range of aspects the 16 Federal States used different approaches, especially concerning:

- the selection and analysis of assessed parameters like chemical-physical parameters, specific pollutants

- the determination of significance thresholds and threshold values
- the aggregation of results to the whole water body

The assessment, which has been performed by the German Laender until end of 2004 came to the following conclusions regarding surface waters:

- about 14% of the assessed water bodies the environmental targets are likely to be achieved
- for about 26% of the assessed water bodies it is unclear whether the environmental targets can be achieved
- about 60% of the assessed water bodies the environmental targets will probably not achieve the environmental targets without additional measures

About 63% of water bodies have been classified as being in natural conditions, about 23 % have been classified as heavily modified and about 14 % as artificial.

CZM data projects

The Federal Maritime and Hydrographic Agency (BSH) has established an information system called CONTIS, which is the acronym for Continental Shelf Information System. This GIS database comprises information on the different existing and planned uses like offshore wind farms, pipelines, cables for energy transfer and telecommunication, military training areas, sediment extraction sites, dumping sites for dredged material, shipping routes, anchoring areas as well as nature conservation areas on the German shelf. Maps can be downloaded from the BSH website (see www.bsh.de/en, go to CONTIS maps).

There is a wide range of other projects and mechanisms dealing with environmental data and/or metadata, especially regarding the physical setting and environmental conditions of the North Sea and the Baltic Sea. A starting point for Geodata is the GeoSeaPortal of BSH: http://www.bsh.de/de/Meeresdaten/Geodaten/index.jsp

Within the frame of the setting up targets and principles for spatial planning in the German EEZ, an environmental report following the rules of Strategic Environmental Assessment will aggregate a lot of environmental information for the German EEZ.

ICZM research projects

The federal ministry for the Environment, Nature conservation and Nuclear safety supports the implementation of ICZM with 3 research projects. Due to the recommendation to continue the dialogue-process, a research project ICZM Coordination Centre was commissioned. The goal of this research project is to lay the groundwork for the dialogue and the decision-making process among the German federal ministries, the Laender and other relevant institutions with regard to setting up an ICZM Coordination Centre which will act as a moderator and support implementation. The key objectives of the project include comparing different organizational models and reviewing the respective legal, technical and financial prerequisites. This project should produce well-founded proposals for various organizational options for the ICZM Coordination Centre and its practical implementation.

Another research project aims to propose strategies, instruments and measures for efficient land use on the basis of practical examples. During the first part of the project, a review and analysis of land development is required, whereby the following points will be investigated in 5 work packages:

1) Settlement development from 1990 to 2000,

2) Environmental impacts, interaction between land and sea,

3) Influence of demographic change,

4) Impact of rising sea levels,

5) Influence of the Water Framework Directive: waterbody expansion and maintenance.

The second part of the project aims to elaborate development paths using scenarios up to 2030 based on the findings about the future development of the coast and, therefore, the demand for land. The third part of the project consists of identifying problems and elaborating solutions for four different practical examples with the help of ICZM .The experience gained will then serve as a basis for recommendations on activities by local or regional organizations and other actors in the ICZM process, in particular with regard to a) legal instruments, b) economic instruments, c) planning instruments and d) an ICZM procedural model.

A third research project deals with the impacts of climate change on the Wadden Sea and has two main goals:

1) to contribute to an optimized coordination between coastal protection, nature conservation and other stakeholders in dealing with potential impacts of climate change on the Wadden Sea region and .

2) to supply about two or three practical and successful examples of an integrated coastal zone management (ICZM).

In this framework, strategic project management will be tested as a potential model. An independent Project Initiation and Coordination Centre (PICC) will be set up. The Michael-Otto-Stiftung preliminary commissioned with the project management, will provide a neutral platform, moderate and motivate, supported by a project committee of experts. The Coordination Centre will establish different working groups. One will be concerned with outlining a vision for the development of the Wadden Sea region and others with the selection of and support for at least two ICZM projects.

ICZM development in Germany is also accompanied by two large research projects (currently funded from 2004–2007) funded by the BMBF, each of them with a range of subprojects. Both projects have been extended until end of April 2010. The aim is to accompany ICZM development with relevant research as well as methodological development for ICZM including tool development.

1. Zukunft Küste Coastal Futures: The project is designed to support development of methodological approaches for sustainable development along the North Sea coast of Schleswig-Holstein. The thematic focus is on the assessment of interactions regarding offshore-wind farms, including impacts for regional economic development and infrastructure, conflicts between stakeholders and associated societal values like the perception of the coast by local people. Based on scenario techniques as integrating element for natural and social sciences, the project works along four lines of ICZM:

   a) human demands and perceptions and the communication processes between stakeholders;

   b) dealing with risk and uncertainty;

   c) dealing with development opportunities;

   d) mechanisms for managing and steering multi-scale alterations of sea use patterns.

2. ICZM-Odra: The aims and tasks within the project result from the specific situation and demands of the region, especially with the aim to establish and support a regional initiative on ICZM. Major element for public participation and the involvement of authorities is the Regional Agenda 21 'Oder Lagoon'. The creation of sustainable perspectives and structures, exceeding the duration of the project, is the core of all activities.

Coastal Futures as well as ICZM Odra are internationally embedded in LOICZ. ICZM Odra works also cross-border in cooperation with Poland. In addition, GKSS Research Centre (www.gkss.de) runs the German node of ENCORA, thereby providing the interface between coastal research in Germany and the European arena. Ongoing EU research projects include SPICOSA and ASTRA (both using the Odra estuary as case study).

5e. NORWAY (updated in 2009)

In Norway the coastal zone (equal to the definition in the EU Water Framework Directive) covers an area of about 100,000 km^2 and extends about 85,000 km (including islets and islands). It has a complex topography with many deep and sheltered fjords, often with sills, and more exposed skerriesy or open coast. Rocky shores and many basins with relatively large depths are common features along the Norwegian coast. The fisheries along the coast and, in more recent years, fish farming, are important to the Norwegian community, its welfare and economy in the long-term perspective. Crucial conditions for these industries are the maintenance of high, natural production and biodiversity and good water quality along the coast, which call for sustainable management of human activities and exploitation of resources. The utilization and production of marine, renewable resources cannot be sustained where the functional integrity of coastal systems is degraded.

The coastal zone is the key area for many marine species. The areas where the large oceanic stocks spawn are important both for the stocks, the coastal ecosystem, the fishermen, and for the people living or recreating along the coast. These spawning areas should be treated as sacred and every necessary measure to secure these spawning areas into the future should be taken. The threats from anthropogenic activities to the fishery resources, to the health status and to the biodiversity of the coastal ecosystems in general are much the same. Negative influences may be due to inputs of nutrients, toxic substances, and habitat alteration from physical encroachment, oil exploitation and transport, and from introduction of alien species. In addition, the fishery itself may overexploit the resources and use methods such as trawling that may damage bottom ecosystems such as coral reefs and soft bottom habitats. Non-sustainable fisheries may thereby be a threat both to optimal utilization of the resources and to the conservation of biodiversity. Several of the largest oceanic fish stocks in the North-East Atlantic region migrate to the Norwegian Coast to spawn. These stocks thereby transform and transport the vast oceanic plankton production from the Norwegian and the Barents Seas to the coast. Their spawning products, eggs and larvae, are prey for local fish, mammals and birds and are consequently of vital importance to the sustainability of the coastal ecosystem. The large oceanic fish stocks are the basis for important fisheries that together with aquaculture support people living along the Norwegian coast. Therefore it is important to manage the fish stocks so they remain strong and sustainable, and can support the coastal communities both now and in the future. Advanced genetic studies have recently demonstrated the existence of local stocks of the common species Atlantic cod along our coast, and such populations may have differences in age and size at matur-

ity, survival rates and growth rates. The size of these local stocks is considered crucial for recruitment and future fisheries. This new knowledge calls for careful and sustainable management, from both a resource and biodiversity point of view. These local stocks use local spawning areas and are also dependent on nursery grounds in the vicinity. It is important to protect the spawning areas and nursery grounds from pollution and habitat destruction, and to assess the size of local stocks in order to prevent over-exploitation. Because local stocks of cod are very small compared to the North Sea and the Norwegian Arctic stocks, they are easily neglected by the management authorities. Local populations are, however, valuable resources to the local public for leisure and recreational fishery, and may also attract tourists.

As a following up of the Rio-declaration on Environment and Development an extensive mapping of marine habitats and essential biological assets, such as spawning areas and local stocks, has been going on for some years now. This means that we are about to get a much better picture of marine nature and habitats along the coast, although it is still a long way to go to cover the entire coast. In some regions, however, as for the Eco-Region Skagerrak, the mapping is already quite extensive, because local (municipalities) and regional (county-administrations) authorities have given priorities to the mapping tasks and contributed with both money and manpower. The new knowledge on marine nature and biological assets are to some extent already integrated in planning and management processes in these municipalities. And a new law ("Planning and building law"), operative from June 2009, will extend responsibility and tasks of the municipalities for their marine areas from the shoreline to one nautical mile of the sea boundary.

Key issues for sustainable ICZM are:

- Limited knowledge about coastal ecosystems structure and function, and effects of intervention. An important part of this is knowledge about life history of marine organisms
- Identification of the threats to the maintenance of rich and clean coastal ecosystems
- How do oceanic stocks affect the coast and what is the significance of the coast for the oceanic stocks
- Species requirements from the environment, including suitability and their vulnerability with respect to chemical pollutants and eutrophication.
- Population structure and size of local fish stocks, for example of coastal cod and herring, as well as of other fauna (invertebrates) and flora.
- Sustainable exploitation of living, marine resources in coastal waters. (Who is harvesting what?)
- Need for monitoring programs to quantify and characterize recreational fishing effort and catches of commercially important species
- Need for marine protected areas in coastal areas and expected benefits
- Mapping and monitoring of biodiversity, including marine nature and habitats
- Carrying capacity of coastal ecosystems for aquaculture and other human activities
- Interaction between wild and reared organisms
- Benefits and drawbacks with sea ranching
- Non-indigenous marine species in the coastal waters

- Rehabilitation of impacted environments, e.g.. polluted sediments

Projects and activities of relevance to ICZM

In two recent projects, knowledge on the coastal zone have been made available to managers and stakeholders. As the first municipality in Norway, Tvedestrand along the southern coast of Norway has developed GIS-based maps of their marine nature. The information is open to everyone (www.tvedestrand.kommune.no/kartdata) and has so far been very useful in ICZ planning and management. The other project aims to make information on how and where relevant knowledge on the coastal zone can be found, and information on how to use it, available on the Internet (http://www.kystsone.no/). A new GIS system for the whole coast has been established by the Fisheries Directorate (www.kart.fiskeridir.no/adaptive/). The first version combines sea maps, land maps, satellite photos and Aerial? photos that can be displayed with official data on aquaculture, spawning grounds, kelp dredging plans etc. We are also developing tools and guidelines for mapping marine biodiversity in the municipalities along the coast. Models for predicting sea-bed habitats and marine natural features, such as kelp forests and eel grass, are being tested. In another project called MAREANO (http://www.mareano.no/) the sea-bed is being mapped using a multi-beam echo sounder. There is a relatively extensive monitoring scheme along the Norwegian coast that includes many different parameters that generates useful information both for short-term and long-term purposes. The Norwegian Food Safety Authority organises surveillance of algal toxins in mussels to advice the public if it safe or not o pick and consume wild mussels

(http://matportalen.no/Matportalen/Blaaskjell/blaaskjell).

The Institute of Marine Research produces weekly information on the algae situation along the coast (http://algeinfo.imr.no/). In addition there are schemes for monitoring hydrological and hydrochemical parameters at many stations along the coast, surveillance of kelp-trawling and effects of emissions from fish-farming. A large project on possible ecological effects of the introduced Red king crab will be finished in 2010.

Recreational fishery

The Institute of Marine Research (IMR) is now developing survey methods to provide estimates of the total number and weight of commercially important species caught by tourists in Norwegian coastal waters. The project will contribute to increasing knowledge of coastal fisheries resources to support sound management advice that will help secure sustainable fisheries. A pilot study that involved the collaboration with 65 businesses was conducted in 2008 to test field data collection methods including the use of catch logbooks for recording catches and effort by tourists. Data on reporting response rates and the variation in daily effort and catches from more than 800 weekly catch diary forms filled out by tourist fishers was used to develop field data collection methods now used in a National survey of the tourist fishery. A representative sample of 100 businesses will collaborate with IMR in 2009 to obtain catch and effort data via catch diaries filled out by tourist fishers. Reporting of catch and effort will be provided to IMR for every 6th week throughout 2009 from these businesses, selected by stratified random sampling. In order to obtain better and continuous samples from the coastal fishing fleet, knowledge about fleet behaviour and technical developments that influence efficiency and effort, 18 coastal fishing vessels (the Coastal reference fleet) have been contracted. The fleet will probably be expanded during 2008. The vessels are from 9–15 m, and the crew members are trained to conduct self-sampling. Biological samples (length, otoliths, genetic samples, stom-

achs etc) and logbook data are delivered according to contract, which secure a proper statistical coverage for a number of species in time and area. The observations of rare species are also most valuable information from the fleet, together with continuous information about species that are hardly accessible by research vessels, and observations of sea mammals, sea birds, crabs etc. Further, such trust-based cooperation between fishermen and scientist seems to reduce controversies and rather build a common understanding and ownership of improved stock assessments and fisheries management.

MPA

A group at Flødevigen Marine Research Station, IMR, is testing marine reserves (MPAs) as a potential management tool for European lobster (*Homarus gammarus*) in Skagerrak. Catch per unit effort sampling and mark-recapture is conducted annually in three experimental lobster reserves and adjacent control areas along the Skagerrak coastline. The research is carried out according to a BACIP (Before After Control Impact Pairs) design. The reserves were implemented in September 2006, but preselection sampling and collection of 'before data' was conducted in three years prior to the area closure. The project is has been given a preliminarily 10 year horizon, which is considered sufficient time to yield information on the effect of protection. The IMR MPA project has attracted funding for two additional projects from the Research Council of Norway 'Havet and Kysten' programme. The first project (Marine Protected Areas in coastal Skagerrak: a model system for understanding lobster demography and successful introduction of MPAs in temperate waters) uses existing mark-recapture data, telemetry and archival tagging in order to understand lobster demography and behaviour in relation to shape and size of reserves. The second project (An integrated study of stakeholders and living resources in relation to the potential effectiveness of MPAs as a management tool) focuses on socioeconomic aspects linked to the establishment of the existing experimental reserves as well as future implementation of coastal MPAs with a special emphasis on lobster and cod (*Gadus morhua*). IMR is thus seeking to take a holistic approach whilst generating knowledge on MPA performance (biology) and management (socioeconomics). Preliminary results from the first project suggests that lobsters have a high degree of site-fidelity at a scale of a few km, but also have a high activity level (at their home site) during the warm summer months. This project has also estimated natural mortality within a protected area, indicating that male lobsters suffer somewhat higher mortality (0.35) as compared to females (0.30). The second project has made an attempt to map the spatial scale of adaptive variation in coastal cod in Skagerrak, to be used in future spatial management. Roughly, the data suggests that important life-history diversity can be found among local populations at a fjord-scale, corresponding to about 50 km of coastline (Olsen *et al*., 2008). Ongoing field work based on traditional tagging and advanced telemetry will provide estimates of natural mortality, fishing mortality (commercial versus recreational fishers), and site fidelity. An analysis of the implementation process showed that the experimental lobster reserves have a high legitimacy among the local stakeholders, even though most of them (e.g. recreational fishers) were not involved in the implementation process (Pettersen *et al*. in press). Preliminary findings indicate that recreational fishers are catching more lobster than commercial fishers in certain areas, indicating the need to involve these stakeholders in future implementation processes.

Water Framework Directive

The implementation of the EU Water Framework Directive in Norway is now to a large extent brought forward by 9 new regional WFD-authorities. Guidelines for this work and information about the progress can be found at the web-page: http://www.vannportalen.no/hoved.aspx?m=31139. In addition national authorities (Directorate for Nature Management and State Pollution Authorities) organize national and international cooperation on inter-calibration exercises and development of classification systems for ecological status. Recently the first generation of instruction manuals for monitoring and classification of coastal water, including a proposal of localization of reference stations and trend stations along the coast, have been published. By the end of 2009 the first management plans within the framework of the WFD should exist for 9 selected coastal areas.

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5f. SPAIN (updated in 2009)

The National Shores Act, Ley de Costas *(*Ley *22/1988),* defines the coastal zone (Maritime-Terrestrial Public Domain, MTPD) as the area between the landward limit of coastal dynamics influence and the limit of the external continental shelf or of the Exclusive Economic Zone (EEZ). This law, which focuses protecting public use of the coastline, also defines a protection zone, where construction is forbidden) that extends 100 meters landward from the limit of the MTPD (or 20 m for zones occupied by urbanizations built before 1988). The Act also defines an area of influence that extends 500 m inland where urban planning issues and management must be taken into consideration. However, coastal management based on this law has not been entirely effective, particularly in relation to the regulation of construction in the 100 m protection zone, due to lack of accurate data delimiting management zones. In 2006, the Coastal Directorate initiated the Master Plan for Sustainability of the Coasts, which has been renamed the Coastal Sustainability Strategy, with the objective of protecting the MTPD and promoting sustainable use of coastal resources through integrated planning and management. This Strategy is described in more detail in the following sub-section.

Key Issues for ICZM in Spain

- Spain is a mature tourism destination and host to some of the most visited "sun and sand" tourism locations in the world (i.e. Balearic Islands, Malaga, Canary Islands).
- Urban development affected 5 % of the surface of a 10 km-wide area along the coastline in 1990, and 40 % of the human population lived in coastal municipalities in 2005.
- Most (65 %) of the Spanish industrial production is located in the coastal zone.
- 90 % of the imports and 80 % of the exports are done by maritime transport.

- Nearly 70 % of the 48 million foreign visitors to Spain have the coastal zone as their destination.
- Coastal erosion.
- Pollution.
- Overexploitation of fisheries.
- Overall, more than 10 % of the gross national product is generated by economic activities performed in the coastal zone; this percentage can increase up to 65 %-90 % in some regions (i.e. the Balearic Islands).

ICZM Policy Activities

There is no nation-wide legislation specific for ICZM in Spain. The 1978 Constitution transferred most components of environmental and territorial planning to the regional governments, "Comunidades Autónomas". Municipalities are responsible for producing land-use plans. Jurisdiction overlaps are common among national, regional and local governments. ICZM is acknowledged as a desirable goal by the different government levels but there is no standard approach and the degree of implementation varies widely between the different regions. Each region can produce its own environmental legislation.

The Spanish Government is currently elaborating the Spanish Strategy for Sustainable Development (EEDS), which adopts ICZM as a key element to assure the sustainable development of the coastal zone, and declares the cooperation among all levels of the Government and the private sector in the design of integrated strategies for sustainable development as a main goal. As a part of this Strategy, the Coastal Sustainability Strategy, which was mentioned previously, is being promoted by the Spanish Government as an instrument for the Implementation of ICZM at the Spanish national level. This instrument is based on a framework for the integration of coastal administrations at national, regional and local level, which was achieved through a strong public participation mechanism. In addition to generating research to accurately delimit the coastal areas specified in the National Shores Act, the plan is intended to facilitate appropriate coastal planning, based on the principles of sustainable development and knowledge-based decision-making. This is achieved through the development of integrated tools and techniques for the assessment of environmental and socio-economic issues, using spatial database technologies and numerical modelling of coastal processes.

A strong effort was also made to answer to the Recommendation 413/2002/EC on ICZM. The Spanish report was finalized in 2006 and included a stocktaking of actors, laws and institutions which have a relation with the coastal zone and the Coastal Sustainability Strategy as the main instrument for ICZM implementation in Spain. More recently, in the last year, AENOR (Spanish Association for Standardisation and Certification) has been working to generate a practical guide for the implementation of ICZM in Spain. The guide is intended to be completed this summer. The group, which includes various Spanish research institutes, is currently being coordinated by the University of Coruña.

A strategic action towards sustainable water use and preservation and restoration of associated ecosystems, including coastal ecosystems, is being developed to be applied from 2004 to 2008 (Programme A.G.U.A. Ministry of Environment, http://www.mma.es/agua/ informes.htm). An urgent action on the Mediterranean littoral (RDL 2/2004) is addressing the sustainable management of the water re-

sources and will implement numerous water desalination plants along the coasts. Measures to protect the *Posidonia* meadows are foreseen.

There has also been some restructuring of the national government with respect to the environmental ministries. Specifically, in April 2008, the Spanish National Ministry of Environment and the Ministry of Fisheries joined to become the Ministry of the Environment, and Rural and Marine Environments though the Real Decreto 432/2008. This Ministry assumes the competencies on agriculture, fisheries, alimentation and environmental issues. This Ministry has to deal with the measures against climate change, protection of natural environment, biodiversity and of the seas, water, rural development, food, fisheries etc. from a sustainable and protective policy (http://www.mma.es/), including a project on detection and elimination of jellyfish. Between the multiple activities, the Ministry has issued a methodological guide for the installation of artificial reefs. This protocol deals with methodological aspects as well as on the use of artificial reefs for coast protection, regeneration of ecosystems, recreational uses, as well as to the traditional use for fisheries exclusion.

Finally, in the framework of the Barcelona Convention (Mediterranean Action Plan, MAP), Spain hosted and signed the Protocol on Integrated Coastal Zone Management in Madrid, together with fourteen Contracting Parties to the Barcelona Convention, in January 2008. This is the 7th Protocol in the framework of the Barcelona Convention and all the Parties are convinced that this Protocol is a crucial milestone in the history of MAP, which will allow the countries to better manage their coastal zones, as well as to deal with the emerging coastal environmental challenges, such as the climate change.

Local and National Research Initiatives

The Spanish scientific community works in the field of coastal ecology, both on applied (coastal management, environmental conservation, and biological monitoring) and basic aspects (biodiversity, benthic ecology, and productivity), with efforts on Integrated Coastal Zone Management (ICZM) studies and applications to fulfil the EC Recommendation on the application of ICZM (EC-30 May 2002). Spain built up a network of researchers and institutions interested in Integrated Coastal Zone Management (HISPACOSTA), which forms an active part of the European Network for Coastal Research Coordination Action (http://www.encora.org). Currently, the Spanish National Research Council is a partner on the recently initiated Knowseas Project (FP7 Programme).

On July 2008 the Polytechnic Valencia University organized a Workshop to implement and discuss the use of GIS for coastal zone management. The development of new tools to measure the CZ changes in parallel to the developments on spatially high resolution tools (satellite images, LIDAR aero transported) was discussed. The goal is to achieve a better understanding of the dynamics of change in the CZ (http://cgat.webs.upv).

In early 2009, Oceana and Fundación Biodiversidad presented a proposal to protect marine areas in the Spanish South Atlantic and Mediterranean (www.oceana.org/fileadmin/oceana/uploads/europe/reports/propuesta_areas_marinas_importancia_ecologica.pdf.). The Spanish government, through Fundación Biodiversidad, and in collaboration with Oceana, has begun a project called LIFE+ INDEMARES, supported by the European Commission, to study potential new areas for conservation. The project aims to study and propose 10 marine protected areas. This project is aimed at helping

Spain to reach the UN international target of protecting at least 10% of the world's marine areas by 2012. Spain currently protects only 0.5% of marine areas.

SOCIB/Ocean_BIT is a new International Coastal Observing and Forecasting System based in the Balearic Islands. SOCIB/Ocean_BIT (co funded at 50% by the Spanish Ministry of Science and Innovation and the Balearic Islands Government) is the first Large Scale Infrastructure Facility that will be established in the Balearic Islands in the frame of INGENIO 2010 Program, with an approved budget of 36 million Euros for the period 2008–2021. SOCIB/Ocean_BIT is a multi-platform distributed and integrated technological facility that will provide streams of oceanographic data and modelling services in support to operational oceanography in a European and international frame. SOCIB/Ocean_BIT will be also contributing to the needs of marine and coastal research in a global change context. This initiative will focus on Operational Oceanography, understood in a wide sense, i.e., including both the systematic, long-term routine measurements of the seas and their interpretation and dissemination and also the sustained supply of multidisciplinary data to cover the needs of a wide range of scientific research priorities. In particular, ICZM activities are specifically included.

Recreational fisheries

Marine recreational fishing is a cause of exploitation of the coastal zone, since angling is a popular activity around the world. In the Mediterranean a total of 2 million anglers and 300,000 recreational fishing boats have been estimated. Consequently, a sector of great economic and social value has risen. The continuity of this sector depends on the ability of the ecosystems to provide sufficient biomass (Post *et al*., 2002). Recreational fishing is basically an open access activity, since fishing permits are very affordable and there is no limitation on the number of licenses granted. Recreational fishing regulations include daily bag limits, minimum catch sizes, closed seasons and the prohibition of artisanal methods. Although the sale of fish is prohibited, it is common knowledge that it happens occasionally. Usually recreational fisheries are considered different from professional/commercial fisheries because they are not subject to the market economic forces.

Along the coast of Majorca catch volumes for recreational fishing have been placed in 1209 t/year, nearly 60% of the total catches declared by the artisanal fishing (Morales *et al*., 2005). On the other hand, spearfishing, with apical predators being its primary catches, has a considerable effect, as the gradual shift on the species catch composition in Majorca clearly shows (Coll *et al*., 2004). Additionally, recreational fishing has been shown to affect the growth and reproduction of coastal species (Coll *et al*. 1999; Palmer *et al*. in press). According to this data it is clear that recreational fishing has important ecological consequences. However, there is a lack of global studies on the economical return that this sector generates, although data from recreational fishing from boats indicates that in Gerona, Barcelona and the Balearic Islands this sector produces 4 times more the added value of professional fishing (TRAGSATEC, 2004).

Therefore, coastal fishing resources are shared between a regulated professional activity and an open access recreational activity. In a recent study, some artisanal fisherman from Majorca reported considering some anglers as a threat (Merino *et al*. submitted). Clearly, the large recreational activity and the artisanal fishing overlap and compete for a common resource. Managing these shared resources should take into account the size of the resource, its uses, the corresponding rights, the impacts by each kind of fishing and the economical benefits generated, as well as the right of the population to fish as a source of healthy food (Kearney 2001).

Besides the interest in coastal biodiversity conservation and health, it is important to consider that recreational fishing represents an important side economic activity (fishing gears, lure, boats, moorings, charters) that has not been completely evaluated yet and whose existence is dependent on the state of the resources and the marine environment as a whole. Interestingly, the CGPM (organ dependent on the FAO) in his 31st meeting celebrated in Rome in January 2007 emphasized the need to include recreational and sport fishing for the correct monitoring of the fish trade and the market flows. Additionally, the compilation and later examination of data from the recreational and sport fishing is suggested.

In Spain data from the various studies on recreational fishing are not coordinated by any official management organization. Most data are gathered by affiliations, federations or fishing clubs, although in the Balearic Islands the Dirección General de Pesca (D.G. Pesca) collects systematically the results of competitions from 1998, having been partially analyzed and published in Coll *et al*. (2004). Therefore most data correspond to short term study projects or to partial monitoring of some activities. The interest in the Balearic Islands for this relevant activity is supported through research projects carried out by IMEDEA funded since 2002 by the D.G.Pesca and the Ministry of Education and Science. As a first step the evaluation of the relevance of the recreational fisheries was undertaken (Morales-Nin *et al*., 2005), the current study (www.roquer.org) is implementing a GIS to describe the fishing distribution effort (Figure A5.1), the effects of fishing on the population parameters, fish mobility (Figure A5.2) and gear selectivity.

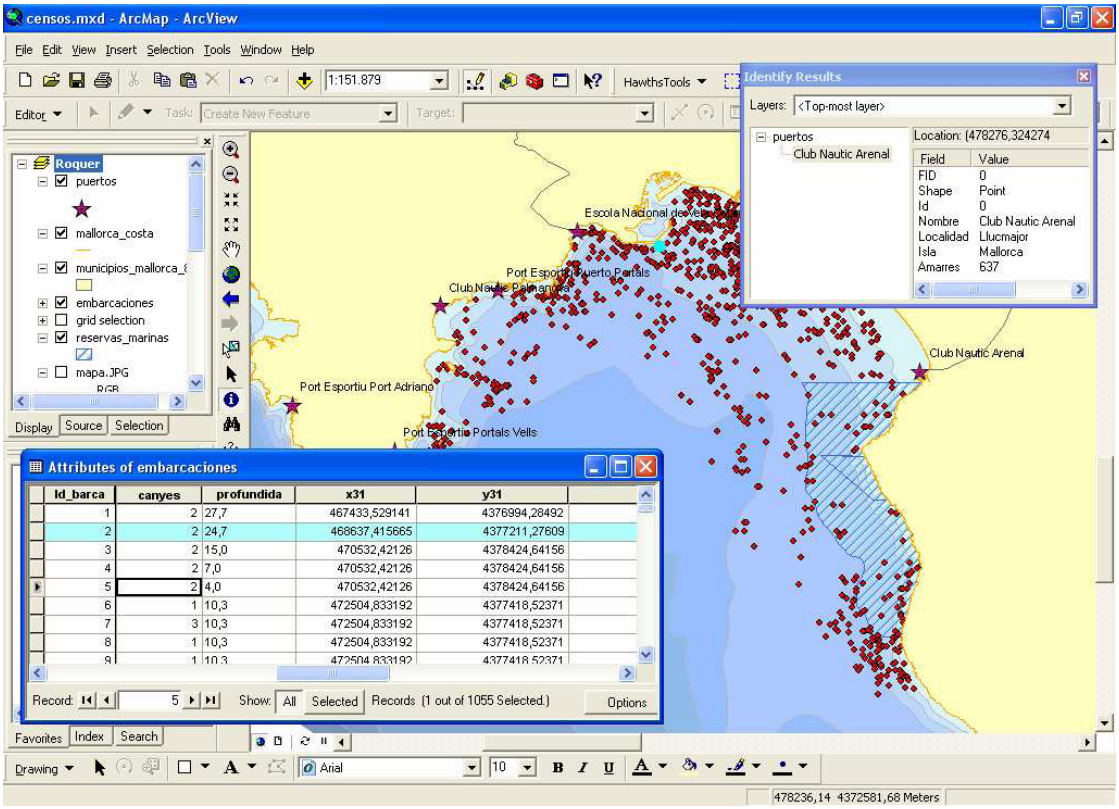

Figure A5.1: An example of the GIS implemented at IMEDEA showing the recreational fishing effort in Palma Bay.

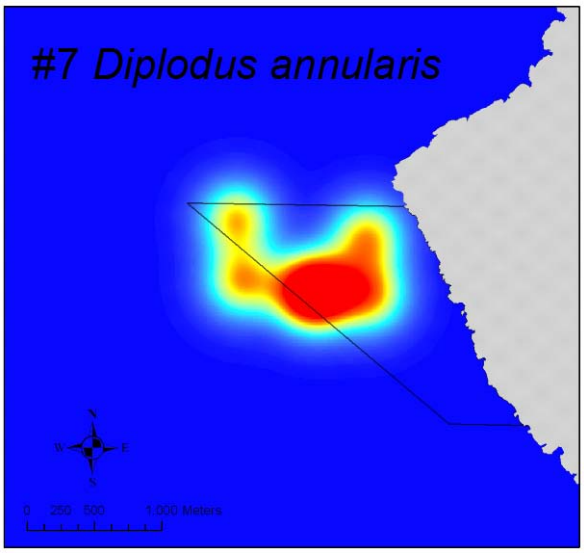

Figure A5.2: Home range of one of the target species for recreational fisheries determined by acoustic telemetry (courtesy of David March, IMEDEA). The line corresponds to the boundaries of a Marine Protected Area.

While the impacts of fishing on fish populations and demersal and pelagic marine ecosystems are well documented for commercial fishing, the impacts of artisanal and recreational fishing -as well as their relationships- on the coastal ecosystem have received little attention. Nevertheless, the interest on recreational fishing as a leisure activity is growing rapidly, creating a potential conflict between this open access type

of fishing and the regulated artisanal fishing. On the other hand, this intense fishing activity may have multiple effects over the exploited species and the coastal ecosystem.

The objective of the Spanish project CONFLICT (CGL2008–00958) coordinated by IMEDEA(CSIC/UIB) is to conduct an integrated socio-economic study of the artisanal and recreational anglers, the fishing activity (habits, effort, catches and generated mortality) and its effects on the main exploited species (demography and biological changes) along two areas of the Balearic Sea (Northwest Mediterranean). The aim is to establish the foundations for the sustainable and adaptive management of coastal resources, which are deeply affected by anthropogenic activities. An adaptive management of the ecosystem is necessary to avoid the collapse of the populations and maintain the resiliency of the coastal ecosystems, the health of the fish stocks and the quality of the fisheries.

Effects of thermal, chemical and saline pollution produced by desalinisation and power plants

The chronic lack of fresh water in some parts of Spain has motivated the use of desalination plants since the 70's. The improvement on the technology and the reduction of costs with the public support to them have resulted in around 900 desalination plants on 2004 with a capacity of 1,45 10^9 l/day representing a 30% increase from 2001. These plants correspond to two modalities the plants treating sea water (47%) and brackish water (53%). The budget allocated to desalinisation plants building was on 2004 360 M€, with an increase of 9% since 2003. Thus Spain, with 7% of the worldwide capacity, is the largest producer in Europe: about 70% of the Spanish plants are located on the Mediterranean coast and the Balearic Islands, and the rest on the Canary Islands. The production of desalted water by regions on 2004 is as follows: Canary Islands 38%, 14.5% Andalucía, 14% Comunidad Valenciana, 13.5% Murcia and 10% in the Balearic Islands.

The main process in Spain is reverse osmosis (RO) with 95% of all plants. The brine produced has a high salinity (43–90 ups) and contains high levels of chemicals used in the plant and filters maintenance. Concern over the potential adverse effects to marine resources of desalination plant discharges is tempered by the following factors: the total volume of brine being released; the constituents of the brine discharge; and the amount of dilution prior to release.

The constituents of discharges of particular concern for marine organisms include biocides, high metal concentrations, and low oxygen levels. Not all desalination plant discharges contain these constituents; however, where detected, these constituents should be removed or neutralized to acceptable levels before discharge or else adequately diluted in the ocean. The high salt concentration of the discharge water and fluctuations in salinity levels may kill organisms near the outfall that cannot tolerate either high salinity levels or fluctuations in the levels (similarly, if a temporary desalination plant is shut down, the organisms that have become accustomed to high salinity levels and/or salinity fluctuations may be killed). In addition, discharges from desalination plants will be denser than seawater and could sink to the bottom, potentially causing adverse impacts to benthic communities. These effects may be significantly reduced if desalination plant discharges are combined with sewage treatment plant discharges (which are less dense than seawater) or are diluted by mixing with power plant cooling water discharges. At this time, there is considerable uncertainty about how well desalination plant discharges, either alone or combined with other discharges, will be diluted in seawater. The metals may become concentrated in the

upper few micrometers of the ocean (the microlayer), which would be toxic to fish eggs, plankton, and larvae that are located there. Toxic constituents of the plume could be driven by wind or currents to become concentrated in the intertidal zone. Discharge of brine water with high salt concentration, particularly if combined with sewage effluent, may also cause sewage contaminants and other particulates to aggregate in particles of different sizes than they would otherwise. This effect influences rates of sedimentation, and is highly important for determining the well-being of benthic organisms that may be buried or burdened by an increase in deposition of unstable and/or finely suspended materials. If the particles are smaller and stay in suspension, they could interfere with transference of light in the ocean, which would diminish the productivity of kelp beds and phytoplankton. In addition, redistribution of trace metals (e.g., iron, nitrogen, and phosphorus) could change the phytoplankton community to one that is unappetizing to fish and may also be toxic (for example, by increasing the possibility or prolonging the occurrence of a "red tide" condition). Larval fish that feed on the phytoplankton could be forced beyond near shore waters, where they may not survive (Cooley *et al*., 2006).

Two key historical barriers for wider implementation of seawater desalination are water production costs and environmental impact of the plant concentrate. Both the economics of seawater desalination and desalination plant discharge impact on the environment could be improved significantly by co-location of membrane desalination plants with existing power generation stations. Co-location provides a direct connection of the membrane desalination plant intake and discharge facilities to the discharge outfall of an adjacently located once-through coastal power generation plant. This configuration allows using power plant cooling water as source water for the desalination plant and as blending water to reduce salinity of desalination plant concentrate prior to discharge to the ocean.

A desalination plant with the intake connected to the discharge outfall of a power plant usually doesn't require construction of a separate intake structure, intake pipeline and screening facilities (bar-racks and coarse screens). Since the cost of a new surface water intake for a desalination plant is typically 5–20% of total plant construction costs, power plant co-location yields significant savings. Sharing intake infrastructure also has environmental benefits because it avoids the need for new construction in the ocean and seashore area near the desalination plant. Building a separate new open intake structure and pipeline for the plant can cause significant disturbance of benthic marine organisms on the ocean floor. Use of intake beach wells instead of open intakes has similar negative environmental impact on these marine organisms during beach well construction. Under a co-location configuration, power plant discharge serves both as an intake and discharge to the desalination plant. Four key benefits stem from this arrangement: 1) it avoids construction of a separate desalination plant outfall structure, decreasing desalination costs by 5–20%; 2) salinity of the desalination plant discharge is reduced as a result of mixing and dilution of membrane concentrate with power plant discharge, which has seawater salinity; 3) because a portion of the discharge is converted to potable water, total quantity of the power plant thermal discharge is reduced, which lessens negative effects of the power plant thermal discharge on the aquatic environment; 4) blending of desalination plant and power plant discharges results in dissipation of both salinity and thermal discharges.

One key additional advantage of co-location is the overall reduction of desalination plant power demand and associated costs of water production as a result of warmer source water. Source water of the RO plant is typically 5–15°C higher than the tem-

perature of ambient ocean water. This is of significant benefit, especially for desalination plants with cold source seawater (such as ocean water in Northern California), because the RO membrane separation of 10°C of warmer seawater requires about 5–8% lower feed pressure, and, therefore, proportionally lower energy use for seawater desalination. Since power costs are about 20–40% of total costs for production of desalinated water, use of warmer source water has a measurable beneficial effect on overall water production costs (Voutchkov, 2007).

The new combined cycle thermal plants, using natural gas, are now under development in Spain. In some cases a new desalination plant has been associated to an existing thermal plant. This was the case with the largest desalination plant in Spain (Carboneras, in Almería), where the brine from the desalination plant is mixed with the effluent of the thermal plant before discharge to the sea.

The marine habitats have different degrees of sensitivity to desalination plants. In the Mediterranean coasts of Spain there are five kinds of angiosperms marine prairies, and the most abundant is the *Posidonia oceanica* endemicity. *P. oceanica* has experienced a remarkable regression in the last decades; reason why at the moment is an species protected by law in the autonomous communities of Balearic Islands, Catalonia and Valencia, and is classified as a high-priority habitat by the European Union Directive (Marbá *et al*., 1996). Other sea grass prairies on the sandy sea beds (generally associations of two species: *Cymodocea nodosa* and *Caulerpa prolifera*) of great biological importance are both present in the Mediterranean and Canary islands. The grass prairies contribute to fix and to stabilize sandy deposits; also they can permit algae association communities' development. Finally they are an important marine habitat to different fishes and invertebrate communities.

Sensitivities of marine habitats to desalination plants from Hopner and Windelberg (1996).

a) High-energy oceanic coasts, rocky or sandy, with coast-parallel current
b) Exposed rocky coast
c) Mature shoreline (sediment mobility)
d) Coastal upwelling
e) High-energy soft tidal coast
f) Estuaries and estuary-similar
g) Low energy sand-, mud-, and beach rocks-flats
h) Coastal sabkhas
i) Fjords
j) Shallow low-energy bay and
k) semi-enclosed lagoon
l) Algal (cyanobacterial) mats
m) Seaweed bay and shallows
n) Coral reefs
o) Salt marsh
p) Mangal (mangrove flats)

In Spain, environmental impact assessment was established on 1986 as a basic regulation in environmental matters with Royal Decree 1302/1986 of 28th June, in agreement with European Directive 85/337, concerning the evaluation of the incidences of certain private and public projects. Later on further regulations were issued, such as

including the Environmental Impact Assessment Decree (EIA), which includes a list of those activities where an environmental impact assessment is mandatory. One of these activities is water desalination whenever new or additional capacities become larger than 3,000 m3/day. Nevertheless this EIA Decree is only the basic regulation for Spain, since the different regions (Autonomous Communities) are entitled to produce their own procedures, including the capability to issue their own screening and scoping procedures (establishing the activities subject to environment impact assessment and the terms of reference for the assessments themselves).

The thermal pollution is controlled by legal normative, which generally restricts the cooling-water effluent temperature. For instance, in Spain the limits are 8ºC above inflow water and is preceptive/mandatory that the environmental temperature does not increase above a mean of 3ºC at a distance of 200 m from the outflow pipe. The total water temperature must not reach over 30ºC. An environmental impact study is perceptive before a new plant is installed.

A host of associations are related to desalinization in Spain: the Association for the Use of Water (http://hispagua.cedex.es/), Canary Islands Water Association (http://www.fcca.es/) and the Spanish Association for water Desalination and Reuse (http://www.fcca.es/) are the main ones. At international level IDA (http://www.idadesal.org/) and the European Desalination Society (http://www.edsoc.com/home.htm) are promoting technological developments and best practices. It is interesting to mention that in their web pages the impacts of the effluents are not considered.

Very little information is available on the impacts of desalination plants on the marine environment. For example, few monitoring studies have been conducted on the marine resource impacts of discharges from plants operating in the Mediterranean and in Canary islands. Most of them are related to environmental impacts, mainly generated by the discharge into the sea of the brine produced, which can affect marine benthic communities.

The extent of the environmental impacts of reverse osmosis desalination reduction when brackish groundwater is used instead of sea water, was assessed using the Life-Cycle Assessment (LCA) methodology, on two water production plants: the brackish groundwater scenario based on a plant located in Almería (southern Spain), while the sea water scenario is based on literature data. The results of Muñoz and Rodríguez Fernández-Alba (2007) show that the key life-cycle issue of brackish groundwater desalination is electricity consumption, and since this is substantially reduced with regard to using sea water, the life-cycle impacts are found to be almost 50% lower. Potential local impacts provoked by brine discharge are also found to be lower, due to a reduced content of salts.

Regarding impacts on benthic communities several studies deal with the *Posidonia* meadows, which are very sensitive to salinity increases (García and Ballesteros 2001, Buceta *et al*. 2003, Fernandez-Torquemada *et al*. 2004). Laboratory and field experiments showed significant effects on seagrass structure and vitality at salinities of 39.1 and 38.4, respectively. Due to this high sensitivity of *P. oceanica* to salinity increases, it is recommend to avoid design and construction of brine discharges in areas where these ecosystems or others that are potentially sensitive occur. However, when this option is not possible, it was suggested not to exceed neither 38.5 psu of salinity in any point of the meadow for more than 25% of the observations (on an annual basis) nor 40 psu of salinity in any point of the meadow for more than 5% of those observations (Sánchez-Lizaso *et al*., 2008).

In the Canary Islands brine reject is always the main environmental problem, and his discharge is usually done jointly with the discharge of waste water treatment, thus diluting it. There are some marine species affected by the salinity of the brine discharged into the sea, as grass prairies or red algae (*Rissoella Verruculosa*) (Sadhwani *et al*., 2005).

Monitoring of the effects of the Alicante desalination plant showed brine dilution lower than what was foreseen. Near the discharge point dilution is very strong but a layer of high density water expands over the bottom at a distance of several kilometres. Echinoderms, osmo-conformer organisms, disappeared on the area of brine influence as well as *Posidonia* vitality was affected after one year plant functioning (Fernández-Torquemada *et al*. 2004, 2005). Other plants on the area seem to cause less damage when the environmental impact is taken into account during planning (Malfeito *et al*., 2005).

Intake of water directly from the ocean usually results in loss of marine species as a result of impingement and entrainment. Impingement is when species collide with screens at the intake; entrainment occurs when species are taken into the plant with the feed-water and killed during plant processes. These effects have not been considered in the impact assessments carried out in Spain.

A holistic view of the effects of desalination is seldom undertaken. In a recent study of the management of Mar Menor (Murcia) (Martínez-Paz *et al*., 2005) it was shown the implications of the desalination effluents on the complex environmental scenarios (Figure A5.3). Moreover according to the IPCC rainfall patterns with experiment changes over the next decades with an increase of frequency and intensity of droughts. That may result in increases in desalinization and of its impacts.

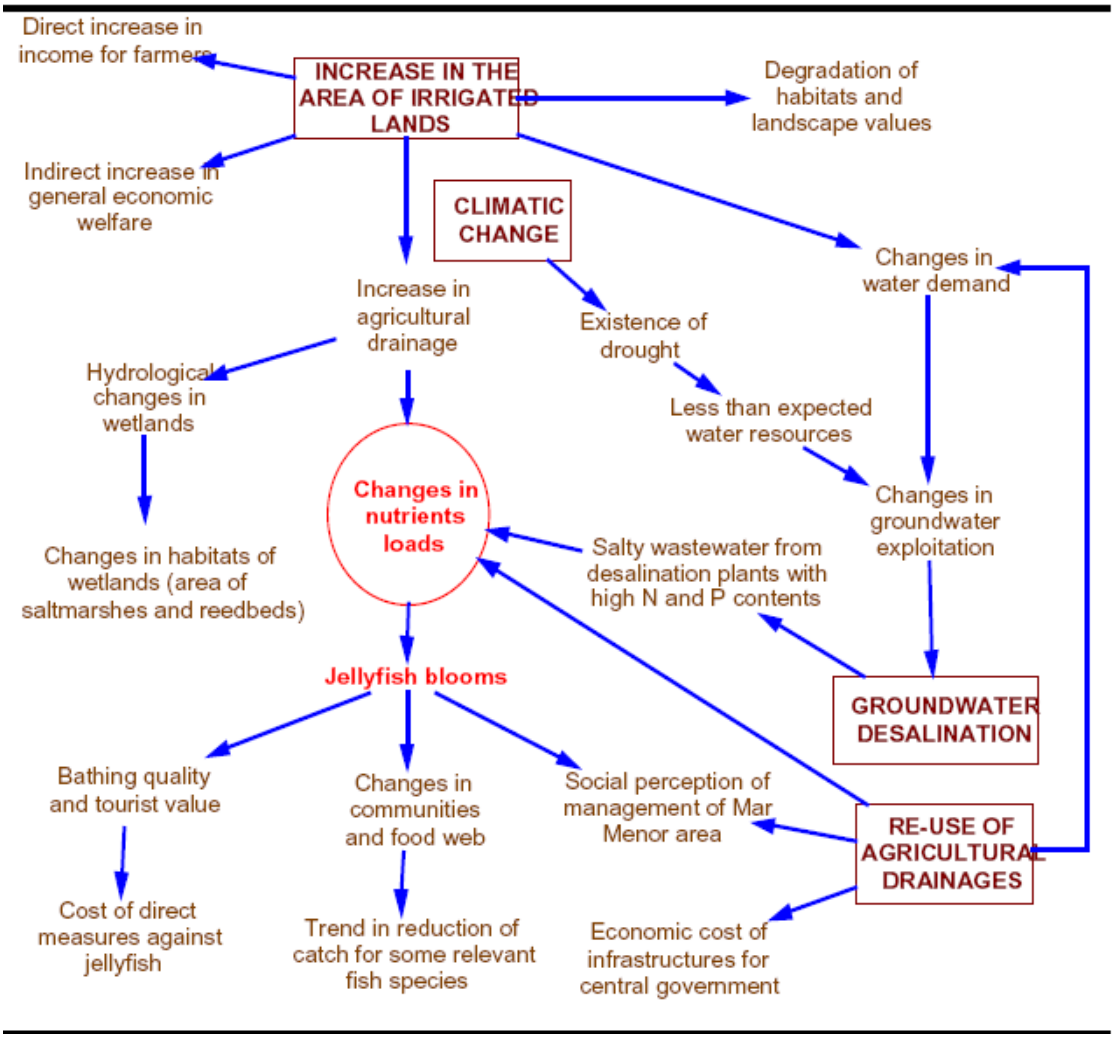

Figure A5.3: Environmental and human impacts associations in Mar Menor Lagoon (Martínez-Paz *et al.*, 2005).

Routine monitoring update

Routine monitoring is an essential component of successful management of coastal and marine areas. This section is intended to summarize the main activities related to monitoring in Spain. The majority of these initiatives are in response to requirements stipulated by European and national level environmental legislation.

Natura 2000 Network

A map of LICs (Lugares de Importancia Comunitarias) designated under the Natura 2000 network is available online at the Spanish Ministry of Environment's webpage

(http://www.mma.es/portal/secciones/biodiversidad/rednatura2000/). There are currently 1.381 LICs listed on the website, categorized at the level of autonomous communities, including links to text files with information (characterization, vulnerability, quality etc.) pertinent to each area. In accordance with the regulations stipulated by the Natura 2000 Network, each region is required to submit a status report to the EC of habitats and habitats of species designated as LICs every six years.

The information on the 27 marine protected areas is available on http://www.faocopemed.org/es/activ/research/mpas.htm#part5 and

http://www.wwf.es/red_amp_espana.php. These are managed by the regional governments including the two national Maritime-Terrestial Parks (Islas Atlánticas in Galicia and Cabrera in the Balearic islands).

Pais Vasco (AZTI and Basque Meteorological Agency)

This service provides real-time oceanographic (currents, tides, waves, sea temperature) and meteorological data (air temperature and pressure, winds, radiation, visibility) through a network of seven buoys located in the main ports of the Basque Country, since 2003 (http://www.euskalmet.euskadi.net/s07-5853x/es/meteorologia/selest.apl?e=5) and (http://www.azti.es/estaciones2005/pasaia/index.asp). In addition, data on sea temperature are collected daily in San Sebastián since 1946.

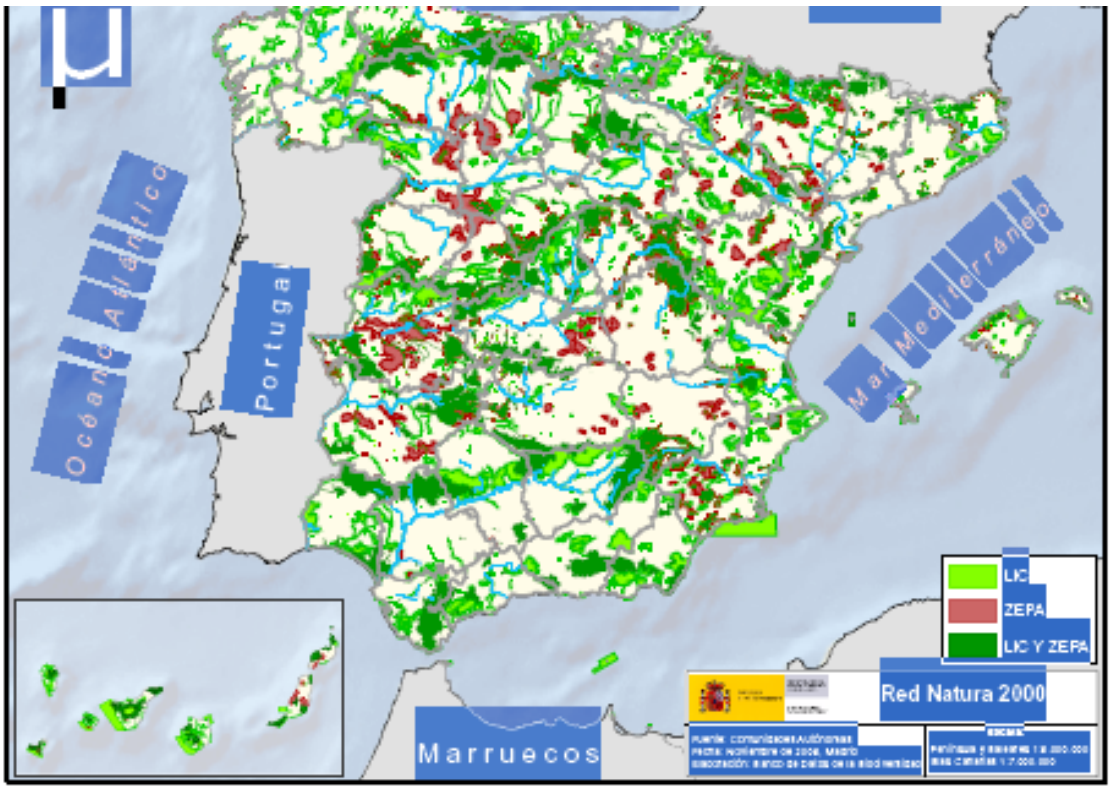

Figure A5.4: Spanish Natura 2000 sites.

Water Framework Directive

The methodologies for establishing indicators associated with the Water Framework Directive are still under development in some transitional and coastal areas of Spain. At the same time, the inter-calibration process is being carried on at national and international levels. The monitoring programs are in operation in almost all the Spanish regions. Spain is participating in the international inter-calibration process; at this moment this has been almost finished for the coastal areas. In the next two years this will be carried out for the transitional waters. An example of available data on line is

provided by the Basque Water Agency. The classification of the quality status of the transitional and coastal waters in the Basque Country, as well as the complete reports of the monitoring program for the WFD, is accessible on-line at: (http://www.uragentzia.euskadi.net/u810003/es/contenidos/ informe_estudio/red_masas_agua_superficial/es_red_agua/indice.html).

Shellfish Waters Directive

The monitoring of the shellfish harvesting areas (bivalves, gastropods, echinoderms and tunicates) takes into account the parameters and frequencies described in the National and European Legislation together with Guidelines proposed by EU Working Group. Thus, this monitoring takes into account: (i) microbiological status, (ii) chemical status, (iii) presence of biotoxins, (iv) presence of toxic phytoplankton and (v) hydrographical characteristics. These monitoring programs are in operation in almost all the Spanish coastal regions (with the exception of those without shellfish harvesting areas). As an example, the results obtained by the Galician monitoring net can be consulted in: http://www.intecmar.org/ Informacion/Default.aspx. The laboratories to perform the analyses must be accredited; therefore several inter-calibration processes have been carried out.

http://www.idadesal.org/

http://www.fcca.es/

http://www.fcca.es/

http://hispagua.cedex.es/

http://www.imedea.uib.es/gis/

www.caib.es/sacmicrofront/archivopub.do?ctrl=MCRST16ZI16639&id=16639

System of Indicators for ICZM in the Balearic Islands (Dictamen 5/2007)

In February 2009, the Economic and Social Council of the Balearic Islands (Consell Econòmic i Social de les Illes Balears, CES), an advisory body to the autonomous regional government intended to represent societal needs, presented their official mandate for the implementation of a system of indicators for ICZM in the Balearic Islands (*Dictamen* 5/2007) to the Government of the Balearic Islands, with the support of the Balearic Institute of Statistics (IBESTAT) and the Insular Councils of the Balearic Islands. The system of indicators was developed through a collaborative process between IMEDEA and CES from November 2006 – 2007. The final document contains a panel of 54 indicators (environmental, governance and socio-economic) and associated implementation plan, intended to respond to the objectives of ICZM in the Balearic Islands, with the overall goal of achieving sustainability in the coastal zone. The document may be found online at: (www.caib.es/sacmicrofront/archivopub.do?ctrl=MCRST16ZI16639&id=16639). This system will be implemented in pilot sites this year, hopefully, with the support of enabling legislation which is currently being established by IBESTAT.

5g. United Kingdom (updated 2009)

This update also provides details of the current marine and coastal initiatives underway in the Republic of Ireland and the Crown Dependencies of Jersey, Guernsey and the Isle of Man.

The coastline around UK is highly variable with rocky cliffs, firths and beaches, creating a large inshore area (within 12 miles of the coast). The diverse habitats in the inshore zone are vital to the UK's fisheries as they provide important spawning and nursery grounds for white fish and flat fish as well as rich feeding areas to several bird colonies. The clean productive seas of Scotland are also essential for the continued development of aquaculture. In the UK, but especially Scotland the network of Local Coastal Partnerships are key to implementing ICZM. In the UK an important aspect of implementing ICZM is the involvement of Coastal Partnerships to ensure that there is Stakeholder involvement at all levels of decision- making at the coast.

Key issues

Economic contribution of activities in the marine area as per the latest available figures was GBP 67 B, which is made up of: oil and gas – GBP 22.3 B; tourism and recreation – GBP 16 B; strategic – GBP 6.5 B; shipbuilding and repairs – GBP 3 B; ports – GBP 1.6 B; and fisheries – GBP0.5 B.

- The development of urban infrastructure, ports and harbours and the substantial areas of tidal land that has been converted to agriculture through enclosure. This has been particularly intense around the major estuaries.
- A significant percentage (31%) of the coastline is already developed in industrial, commercial, residential and recreational terms. Economic pressure for further expansion of these facilities is likely to increase in the future.
- Approximately 40% of UK manufacturing industry is situated on or near the coast. Much of this industry, along with major cities, is located around large estuaries.
- Most of the Scottish population lives within a few miles of the coast and on its many islands.
- Spatial issues regarding the distribution of resource exploitation in the coastal zone by inshore fisheries, shellfish gathering, aquaculture, game fishing, offshore oil and gas, shipping, recreation, tourism and small scale agriculture.
- Cumulative impacts of coastal and marine developments.
- Flooding and erosion threat resulting from climate change, sea level rise and isostatic sinking are an issue around the south and east of England, requiring coastal defence.
- Decline in inshore fish stocks due to over-fishing and habitat damage.
- Decline in runs of wild salmon and sea trout in many rivers.
- Fish farming (spatial reclamation, benthic impact, disease, escapes, algae blooms).
- Coastal water pollution threatening the collection and farming of shellfish and the local wildlife.
- Offshore energy development

New Policy activities (UK)

Major developments for ICZM in the UK include the new Marine Bill, which completed its consultation phase in June 2007. The Marine Bill (now called the Marine and Coastal Access Bill in England) outlines many proposals that will affect the coastal zone and the implementation of ICZM. The key elements of the Bill are a new system of Marine Spatial Planning; licensing reform, merging some disparate regimes for development consents (but not oil and gas licensing which DTI has ring-fenced); new nature conservation measures in territorial and offshore waters to implement marine protected areas (called Marine Conservation Areas); the creation of a Marine Management Organisation to deliver some or all of the above, together with some existing functions; and changes to inshore fisheries' management in England. The responses to the consultation were generally in agreement with all these proposals and the Marine Bill was presented to the UK Parliament in December 2008.

Defra/ Environment Agency marine planning desk study. In 2008, Defra and the Environment Agency conducted a desk study exercise to look at the way in which the new marine planning and licensing proposals outlined in the draft Marine and Coastal Access Bill might work in coastal areas and the subsequent implications for the operation of the Marine Management Organisation (MMO). In order to explore the possible impacts of the Marine and Coastal Access proposals, a range of stakeholders with a marine and/or coastal interest were asked to participate in two workshops to assess the planning and licensing proposals using case studies in the Thames area and the South West of England.

The key issues highlighted by this study reinforced the comments that had already been made in the Marine Bill and Integrated Coastal Zone Management consultations, i.e. effective engagement with stakeholders, size and scope of marine plans and better clarification of the links between terrestrial planning systems and marine plans. Links to the final report and the annexes, which contain all outputs from the workshop sessions, are downloadable from http://www.defra.gov.uk/marine/environment/iczm.htm

A strategy for promoting an integrated approach to the management of coastal areas in England, sets out the Government's vision for coastal management, objectives and future actions to achieve the vision. The Strategy explains how the work being taken forward in England will contribute to ICZM, including the Marine and Coastal Access Bill, the Planning Act 2008, the Local Government Involvement in Public Health Act 2008 and the Local Democracy, Economic Regeneration and Construction Bill. The Strategy has covered policy and strategic direction, the planning and decision-making process, development of a framework for coastal integration and partnership working, public empowerment, data co-ordination and monitoring.

http://www.defra.gov.uk/marine/environment/iczm.htm.

The Financial Benefits to Working in Partnership at the Coast was a project undertaken with the Coastal Partnership Working Group (CPWG) and the Local Government Association Coastal issues Special Interest Group (SIG) to look at the benefits of working in partnership, was also completed July 2008.The aim of this project, was to carry out a cost benefit analysis to the partners of working in partnership, through local Coastal Partnerships and where possible, quantifying these benefits in monetary terms. The Final Report contains a series of case studies from a range of existing partners, and was very well received. The findings suggested that there were a range of

quantifiable and unquantifiable benefits from the range of services coastal partnerships provide. See the final report and Executive summary at http://www.defra.gov.uk/marine/environment/iczm.htm

UK-wide Marine Monitoring and Assessment Strategy (UKMMAS): Two UK reports, Safeguarding our Seas (2002) Charting Progress (2005) and the Scottish equivalent Seas the Opportunity (2005) specified the need for an integrated assessment of our seas. The overarching aim of the UKMMAS is to make most efficient use of UK resources by: investigating and reporting on objectives for the marine environment; preparation of an integrated assessment framework for multiple use (e.g. future UK Charting progress reports, OSPAR QSRs, Water Framework Directive and Marine Strategy Directive); preparation of Protocols and Monitoring Manual; efficient data archiving; and three evidence groups to collate data and reports.

Charting Progress 2: During 2008 each of the four evidence gathering groups reporting to the UKMMAS committees have compiled substantive evidence on the status of the seas around the UK. This has in some cases involved considerable work compiling databases, re-analysing past data and developing assessment methodologies. These methodologies have now been adopted to some extent to do the assessments for the OSPAR QSR. The reports from each of the evidence gathering groups are being compiled into one summary report but they will also be available separately. The report is due to be released to peer review in April.

The report will also include an assessment of climate change impacts, provided by the Marine Climate Change Impacts Partnership (MCCIP).

Shoreline Management Plans (SMPs): An SMP is a "document which sets out a strategy for coastal defence for a specified length of coast, taking account of natural coastal processes and other environmental influences and needs" (MAFF 1999).

Crown Estate DSS for offshore energy developments.

In January a round 3 of prospective areas suitable for offshore energy developments

New Policy activities (Scotland)

Scottish Sustainable Marine Environment Initiative (SSMEI): This project is now in phase three; the four pilot projects (Sound of Mull, St Abbs, The Clyde and Shetland) are up and running and have been designed to investigate different aspects of Sustainable Marine Management. Topics included are spatial planning, habitat mapping and conflict resolution.

The Shetland project, which started in January 2006 and will run until April 2010, aims to develop an integrated and coordinated Marine Spatial Plan for Shetland. The Plan provides guidance for the placement of different marine activities to improve marine management and reflects extensive public involvement, consultation and consensus. The Plan underwent a public consultation on the first draft and the many comments received have added significant value to the Marine Spatial Planning development process. "Part One: The Policy Framework" has been recently re-drafted as an interim draft, but the "Marine Atlas" (the hard copy of the GIS layers) has not yet been amended. These drafts will be tested until May 2009 with its trial implementation by marine planners, regulators, communities and developers. The feedback will be collated to determine whether it adds any value to the current management regimes.

In contrast to the Shetland scheme, the aim of the Berwickshire pilot is to promote and encourage more sustainable management of the marine environment through enhanced community engagement and participation and initiatives. Examples of such initiatives include: an action plan to develop a sustainable Berwickshire fishery; not only operating within environmental limits, but also economically healthy and integrated harbour management to help the diversification of harbour activities into the tourism market.

The Clyde pilot is concentrating on improving the management of marine and coastal resources in UK waters, which has evolved along largely sectoral lines, resulting in a plethora of legislation. As new and increasing pressures on marine resources develop, it is increasingly recognised that the existing system for formulating decisions in the marine environment needs refinement or modification to make the process more effective. The SSMEI Clyde Pilot will be investigating current decision-making processes and testing new approaches, underpinned by a local Marine Spatial Plan.

Scottish Marine Bill and MMO. The Scottish Government issued its Consultation Document on a Scottish Marine Bill on 15 July 2008 and the consultation period ended on 6 October 2008. The bill is currently being debated in the Scottish Parliament. Full implementation of the Marine Bill in its final form is expected to take approximately two years.

The Bill will introduce legislation to ensure the sustainable management of Scotland's coasts and seas to balance the competing interests for use and protection of the sea. International, EU and national interests will be met through the National Marine Plan while regional planning and ICZM will be met through Scottish Marine Regions. Scottish Ministers agreed to publish the range of characteristics upon which Scottish Marine Regions will be created. The Scottish Coastal Forum, is currently consulting with stakeholders to advise Scottish Ministers of the views on how the Scottish Marine Regions should be formed.

The consultation included details on Integrated Coastal Zone Management (ICZM) and regional planning through Scottish Marine Regions. A majority of the respondents to the consultation believed that the Scottish Marine Regions should be responsible for ICZM and that it should be guided by the EU eight principles of ICZM.

The Consultation identifies areas of potential dispute including:

- Balancing protection of marine habitats and species against the requirements of commercial developments;
- Development at aquaculture / renewable energy sites and difficulties this may cause for navigation;
- Development of undersea infrastructure versus fishing safety requirements;
- Dredging and other maintenance of ports and the impact of those activities on shellfish/aquaculture; and
- Balancing the needs of tourism / leisure activities and the impact upon them of commercial exploitation of the seas.

The intention of the new system is the streamlined, sustainable, economic development of Scotland's marine environment. At present, this environment is subject to the jurisdiction of both the Scottish and UK Governments as well as a patchwork of legislation that lacks the necessary degree of integration required to support that development. Devolved powers relating to the marine environment currently extend to 12

nautical miles from the highest or lowest level of the spring tide (depending upon the relevant legislation or designation) but, depending upon the outcome of ongoing discussion between the Scottish and UK governments regarding further devolved powers, may extend up to 200 nautical miles.

Marine Scotland (the Scottish MMO) is to be established, as a delivery-orientated Directorate of Scottish Government, from 1 April 2009. It will be the lead marine management authority in Scotland. It will bring together, as a first step in the implementation of improved, better integrated marine management arrangements in Scotland, functions and resources of the Marine Directorate of Scottish Government, Fisheries Research Services and the Scottish Fisheries Protection Agency. It seeks to integrate and improve upon existing marine management functions and to prepare to take on new responsibilities and functions once the Marine Bill has been approved by Parliament and receives Royal Assent next year. Marine Scotland will do this both by working with others and by the way in which it carries out its own functions of:

- Evidence based policy development and marine planning
- Streamlining and licensing and consenting
- Sound science
- Effective compliance monitoring and enforcement

Inshore Fisheries Groups (IFGs). IFGs aim to improve the management of Scotland's inshore fisheries and to give commercial inshore fishermen a strong voice in wider marine management developments. Fishermen and their representatives sit at the heart of IFGs and it is their knowledge and ideas that will drive the Groups' work. The Groups will be supported by expert advice (including for example, Fisheries Research Services, the Scottish Fisheries Protection Agency and Scottish Natural Heritage) and their work conducted in consultation with all those with a relevant interest in the best management of an area's fisheries and the wider marine environment.

The IFGs will develop realistic Management Plans, drawn up on an inclusive, transparent and consensual basis, for their area's fisheries. Whilst Management Plans will reflect specific and localised priorities, they will also fit with wider strategic national goals such as sustainable stocks, a healthy marine environment and a profitable fishing sector that supports strong coastal communities. For example, IFG Management Plans could include such things as stock management and enhancement; spatial management initiatives and/or voluntary agreements to improve working relationships amongst different types of fisheries in an IFG area; proposals for funding priorities for an area's fisheries and associated communities; and proposals for legislative change (such as Inshore Fisheries Orders) to support elements of the plan as is appropriate.

An initial set of three IFG pilots: the Outer Hebrides, Clyde and the South East were due to become operational in 2008 followed soon after by a further three - the North West, the Moray Firth and the Small Isles and Mull Groups. However most of these groups have only had initial meeting s with no real progress to date.

Scottish Aquaculture a fresh start; a consultation on a renewed strategic framework for Scottish Aquaculture was launched in August 2008, and sets out the main issues to be tackled to ensure sustainable growth. It identifies five key themes of Health; Planning, Consents and Sites; Containment; Markets, Marketing and Image; Finance, which are linked back to the strategic objectives of the Scottish Government's economic strategy with specific objectives for each objective – theme combination. The

results of the consultation are being compiled and the new strategy will be published sometime this year (2009).

Data projects (UK)

United Kingdom Directory of the Marine-observing Systems (UKDMOS) is a unique searchable metadatabase of marine monitoring conducted by UK organisations. UKDMOS provides a new internet-based tool for searching monitoring programmes with the aim of providing information to coordinate the monitoring across different organisations. As such UKDMOS contains metadata on parameter groups measured, frequency, start dates and other fields which can be searched spatially using GIS. UKDMOS is for the wide marine community and specifically a key output for the UK Marine Monitoring and Assessment Strategy (UKMMAS). The technical build of the directory has relied heavily on outputs from the EU funded SeaDataNet project and the submission of content is funded by the Department for Environment, Food and Rural Affairs (Defra) and the Scottish Government. The monitoring programmes in UKDMOS may also be searched and viewed with other european monitoring programmes in the European Directory of the Ocean Observing System.

Marine Data and Information Partnership (MDIP) was established in March 2005, with partners from the private and public sector, to work towards agreed "public good" goals: Provide a data management and access framework for the UK marine data community; develop marine data management standards, and protocols; contribute to the marine component of the geospatial strategy for the UK; recommend actions and map progress towards achieving coordination of management of UK Marine Data.

One of MDIP's priorities is to provide guidance on standards and protocols for data management, and to build adherence to common standards across the UK. These standards apply to: Acquisition and quality control of data; Data Management standards and best practice and standards for interoperability and metadata.

MDIP has identified an initial set of three marine Data Archive Centres (DACs) who are able to conform to a set of requirements which ensure adherence to best practice: British Oceanographic Data centre (BODC), The British Oceanographic Data Centre data holdings cover many types of marine data including physical, chemical, biological, air/sea interface and sediment data. The United Kingdom Hydrographic Office holds many different marine navigational and environmental data types. Central to this data archive is bathymetric and seabed data. The Data Archive for Seabed Species and Habitats (DASSH) will house marine benthic data and its associated physical and images datasets. DASSH will build on the resources established by the UK National Biodiversity Network (NBN) and the MBA's Marine Life Information Network (MarLIN).

Marine Climate Change Impacts Partnership (MCCIP) produces annual report cards that have explored a wide range of topics, highlighting key impacts for individual components of the marine environment (e.g. seabirds). This year's report brings together these individual components, looking at how changes in one part of the marine ecosystem impacts upon others (e.g. how seabirds interact with all levels of the marine food web).

In exploring linkages within these stories, the information provided on individual topics in previous report cards will form an important part of the evidence base. Conversely the ecosystem linkages report card will help users understand why individual topics in previous report cards are important through ecosystem linkages. The

five topics are: CO2 and ocean acidification: running into the buffers? Arctic sea ice; a view from above: changing seas, seabirds and other food sources; Non-native species and Coastal economies and people.

Research projects (UK and Scotland)

Finding Sanctuary is a regional partnership project, which has the aim of developing a network of MPAs around South West England. The new UK Marine and Coastal Access Act (expected to be enacted in 2009), introduces a new type of MPA, the marine conservation zone, that will form part of the network of MPAs for England and Wales, stipulated under OSPAR. Although "Finding Sanctuary" started without a formal mandate, it has now been adopted as the formal planning mechanism for MCZs. To aid the planning process a Marine Spatial Plan incorporating information on sea floor features, species and habitat distribution and data on human activities. A project called FisherMap, that took place between August 2007 and November 2008, has collated the nature and extent of fishing activities and fisherman's knowledge of marine ecosystems around the South West Coast. Finding Sanctuary will continue to map human activity based on the methodology used in FisherMap. More details of the Finding Sanctuary project and FisherMap can be found at www.finding-sanctuary.org.

Improved understanding and management of recreational sea angling (CEFAS) will run from 2008 until 2011 and has 3 main components:

1) A series of desk studies collating and synthesising existing and historic information on a number of species important for RSA and examining how commercial and recreational fisheries have developed in response to management.

2) Socio-economic studies to evaluate the implications of potential management options for RSA and commercial sectors. These will focus on developing methodology and evaluating the costs and benefits of potential management options for both commercial and recreational angling bass fisheries.

3) Developing new data sources and methodology to evaluate and model recreational fisheries. This will involve identifying and collecting data on species important to RSA. A pilot logbook scheme for anglers to report catch and effort will be established and historic datasets (such as time series of angling matches) will be investigated to provide information relating to historic stock and fishery performance. Other work will investigate assessment and modelling approaches to data poor stocks.

Cooperation from anglers is crucial if the project is to succeed in providing an improved knowledge base to underpin future management of recreational sea angling, therefore part of this project is the "Angler logbook scheme", where The National Federation of Sea Anglers (NFSA) has agreed to work with Cefas to assist in the implementation of a voluntary logbook scheme for anglers. This will provide basic catch and effort data that will be useful to determine the extent of angling activity and catches around the country at present and will provide a time series as the data build up in future years.

Recreational sea angling and marine conservation zones (NE) is a baseline study of the fish species targeted by Recreational Sea Angling (RSA): their biology and distribution, angling techniques used and implications with respect to Marine Conservation Zones (MCZ).

The project has two parts:

1. A literature review will be carried out to assemble and synthesise data on popular angling species, their geographic ranges, habitat preferences, relevant aspects of biology and behaviour and regional angling practices. This will provide an information base with which Natural England can elaborate the implications of interactions between RSA and potential target fish species in relation to the aims and management of MCZs.
2. Surveys of recreational sea anglers will be carried out around the coast by interview and mail, consisting of a questionnaire consisting of 3 sections to capture information regarding:
   a) species and methods,
   b) anglers attitudes to conservation and MCZs,
   c) acceptability of different management measures.

Cefas is carrying out surveys in the Northeast, the Northwest and the Southeast during January 2009. These surveys will provide information on angling as well as providing an opportunity for anglers to make their views on MCZs known. The survey has now been closed, and the results are currently being compiled.

Sustainability Indicators for Scottish Aquaculture is aiming to develop sustainability indicators for Scottish aquaculture.

The objectives for this project are:

- Develop practical and informative indicators of the environmental sustainability of aquaculture in Scotland.
- Apply these indicators to aquaculture in Scotland to provide ongoing information on direction of change of environmental interactions (i.e. towards or away from sustainability).
- Assess the scope for expansion of aquaculture production within present environmental legislation and technical capability, and the likely impact of expansion on these indicators.
- Assess the likely impacts of climate change on these indicators, and in particular on assimilative capacity of receiving waters and disease interactions
- Desk based studies to assess the effects of temperature rise on:
    - Species currently being farmed or present within the wild populations in Scotland;
    - the current disease problems in both farmed and wild fish and the possible introduction of exotic diseases;
    - seasonal distribution of diseases such as VHS and BKD and parasites such as sea lice and argulus.

The planned structure for the development of these indicators has included the development of objectives that back up the policy objectives from both environmental legislation and Government strategies; the development of frameworks that follow a recognised system, in this case the "Activity-Pressure-State-Response" (APSR) framework; the use of existing tried and tested models and existing data, and ensuring that they can be used at many scales for example at the country wide/ regional /sealoch or site scale.

It is envisaged that suitable indictors could be produced for several environmental interactions including: benthic enrichment, nutrient release, ecosystem-effects of nu-

trient release, feed materials, disease control and interactions and the occupation of space.

To achieve these objectives the indicators will need to be able to inform specific management advice on where fish farming is:

- Below sustainable levels – where there is scope for development
- At sustainable levels – where there is no scope for expansion
- At unsustainable – where there should be a reduction in fish farming

For each indicator, there is a point where any negative impacts will be considered excessive/unacceptable. The Maximum Sustainable Activity (MSA) is the point immediately before this, where a suitable precautionary buffer is applied to ensure that this is within the error limits of the data available.

The majority of fish farms are within the modelled sea lochs (and voes), which, due to their semi-enclosed nature are more like to suffer from sustainability issues. Sea lochs and voes also offer convenient areas for applying management advice. Therefore it seems logical to concentrate on the sea lochs (and voes) in the development of these indicators. Once the basis for effective indictors in the sea lochs has been developed they could then be expanded to include the coastal fish farms.

Sharkatag2009 is a shark tagging event following on from the successful spurdog 'tagathon' Scottish Sea Anglers Conservation Network (SSACN) held around Loch Sunart in Autumn 2008. Anglers fishing from the shore, kayaks and boats will be visiting marks around the Solway looking to catch and tag tope, smooth-hound and spurdog and collect data on other shark species. The event will run from the 12th to the 14th of June 2009; its main aims are to tag as many fish as possible from the shore and boat; to highlight the urgent need for shark, ray and skate conservation in Scottish waters, and to raise the public awareness of sea angling.

Progress on MPAs (Scotland and UK)

The new UK Marine and Coastal Access Act (expected to be enacted in 2009), introduces a new type of MPA, the marine conservation zone, that will form part of the network of MPAs for England and Wales, stipulated under OSPAR. "Finding Sanctuary" is developing a methodology for the marine conservation zones that will form part of the network of MPAs for England and Wales, stipulated under OSPAR. Although "Finding Sanctuary" started without a formal mandate, it has now been adopted as the formal planning mechanism for MCZs.

In Scotland's Marine Bill consultation, Scottish ministers have proposed the introduction of new flexible powers to identify, designate or recognise particular locations of biodiversity importance. These new sites will complement existing international requirements (e.g. Natura and OSPAR) but could also ensure that sites of potential importance to Scotland could be designated without any international requirements.

Scotland's first 'No-Take Zone'. The Scottish Government has created Scotland's first 'No-Take Zone' in Lamlash Bay on the Isle of Arran. All fishing within the specified area will be banned while a scientific trial will be carried out to investigate the fishery and bio-diversity benefits of leaving the seabed to regenerate naturally without any disturbance.

Water Framework Directive position (Scotland and UK)

River Basin Management Planning (RBMP) is the basis of management of the water environment under WFD and is based on natural river basins, including areas of land from which water flows towards the sea and enters it at a single point (catchments or river basins). The river basin approach takes into account that an activity upstream in a basin might have an effect further downstream in other water bodies including groundwater, and allows us to manage such effects (catchment-coast management).

In England the WFD is implemented through a Statutory Instrument 2003 No. 3242 (The Water Environment (Water Framework Directive) (England and Wales) Regulations 2003). Draft River Basin Management Plans were published for consultation in December 2008 before being adopted in December 2009. Northern Ireland has also published its RBMPs for consultation over the same period. England has 9 River Basin Districts plus two cross-border districts with Scotland.

The WFD is implemented in Scotland through the Water Environment and water services (Scotland) Act 2003 (WEWS). To control discharges from point sources the Water Environment (Controlled Activities) (Scotland) Regulations 2005 have been introduced to deliver WFD objectives and became fully operational in April 2006 and the new point source, impounding, abstraction and engineering regimes also started then. In December 2006 the monitoring programme became operational, however in 2008 SEPA designed a new risk based monitoring network to meet the needs of the WFD. Scotland has one River Basin District, plus the two cross-border districts with England.

50 per cent of Scotland's water bodies do not currently meet the WFD "good status"' environmental objective. Environmental improvements will be balanced against sustainable water use, and this will be addressed by the RBMP framework through several work programmes. SEPA has produced a draft RBMP for the Scotland River Basin District, and has worked with the Environment Agency to produce a draft plan for the Solway Tweed RBD. These draft RBMPs were available for consultation from December 22, 2008, with a view to publish the final plan in 2009.

National report on coastal recreational fisheries (Scotland and UK)

There is no government led system for the collection of data from recreational fisheries, although it is acknowledged that there is a need for it, if only to exclude these catches from the DCR. However, Angler groups state that the impact of Recreational Sea Angling (RSA) on stocks is minimal as a large part of RSA involves catch-and-release policies.

The National Federation of Recreational Sea Anglers (NFSA) has produced two reports for the UK government on the scope and commercial value of recreational sea angling (RSA) to the UK economy. There are approximately one million people who participate in RSA in the UK spending some £1Bill each year and creating 19,000 jobs. About 65% of this activity is in England and Wales.

Research by Highlands and Islands Enterprise estimates that almost 80,000 United Kingdom residents visited the Highlands in 2003 to take part in sea angling, which it says supports more than 400 full-time equivalent jobs. Furthermore, Scottish Natural Heritage has suggested that boat anglers spend an average £1,375 each and that the equivalent figure for shore anglers is a not inconsiderable £861. A study that was published by the Department for Environment Food and Rural Affairs calculated the total worth of the sector in England and Wales to be a possible £1.3 billion.

During 2006–2007 a strategy for Recreational Sea Angling (RSA) in England was produced by a sub-group of Defra's Inshore Fisheries Working Group, comprising several national sea angling organisations (NFSA, BASS, SACN), representatives from Sea Fisheries Committees, scientists from the Centre for Environment Fisheries and Aquaculture Science (Cefas), the Marine and Fisheries Agency (MFA), the Environment Agency (EA) and the National Fishermen's Federations Organisation.

The aim of the strategy is to provide a framework for the development and enhancement of sea angling in England. It aims to demonstrate how fisheries management could take better account of sea angling in the way that fisheries policies are developed and implemented. One part of the strategy was to initiate a licensing scheme for RSA. This was not popular and has been put on hold for now but Defra states that a licence on RSA will happen at some point in the future.

Other proposals included a ban on commercial fishing within 1 mile of the shore, a bag limit and representation of the RSA sector on the Sea Fisheries Committees (SFCs).

There are two further projects concerning RSA that have been outlined in the research projects section.

Report on national time-series coastal monitoring programmes (Scotland and UK)

The Fisheries Research Services (FRS) Coastal Long Term Monitoring project was set up in 1999 to monitor water quality parameters at 10 sampling sites around Scotland. The measurements taken as part of this monitoring are used to create a continuous time series of the variation in key properties of the sea. This time series data set will enable us to study the impact of climate change on Scottish coastal waters, as well as giving us information on typical background conditions. Parameters measured include water temperature, salinity, nutrients (such as phosphate, silicate, nitrate and ammonia) and phytoplankton.

In other schemes the Stonehaven and Loch Ewe Ecosystem monitoring programmes cover one site on the East Coast (Stonehaven) and two sites on the West Coast (Loch Ewe). Weekly samples are taken (weather permitting) with the present and long-term objective to monitor and assess the state of the ecosystem in the eastern, coastal waters of Scotland from the Stonehaven site and in contrasting waters of the Scottish west coast from Loch Ewe.

The UK Marine Environmental Change Network (MECN) is a collaboration between organisations in England, Scotland, Wales and Northern Ireland collecting long-term time series information for UK marine waters. It is coordinated by the Marine Biological Association of the UK (MBA) and is funded by the Department of the Environment, Food and Rural Affairs (DEFRA). The goal of the network is to use long-term marine environmental data from around the British Isles and Ireland to separate natural fluctuations from global, regional and local anthropogenic (human) impacts. Currently, the MECN is working with the Marine Climate Change Impacts Partnership (MCCIP) in the production of an annual report card on the issue of climate.

Republic of Ireland

- Responsibility for ICZM was transferred from the Department of Agriculture Fisheries and Food to the Department of Environment Heritage and Local Government on 5th November 2008.

- Legislation is being prepared to transfer the responsibility of much of the licensing of foreshore activities from the Minister for Agriculture Fisheries and Food to the Minister for Environment Heritage and Local Government.
- The Irish Sea Marine Aggregate Initiative (IMAGIN) has been completed and the Technical Synthesis Report was published in December 2008.

Northern Ireland

- The Northern Ireland ICZM Strategy was launched in June 2006. A key aspect of the implementation of the Strategy was the establishment of a Northern Ireland Coastal and Marine Forum (CMF). This is an independent, non-statutory body made up of a cross-section of interests ranging from local government, business, agriculture, fishing and environmental bodies. The Forum aims to provide meaningful stakeholder input into strategic policies affecting the coastal area, as well as raising awareness on Integrated Coastal Zone Management.
- In September 2008, The Northern Ireland Coastal and Marine Forum published the second of a series of CMF booklets covering the many and varied important issues which face the coast of Northern Ireland. "Maritime Archaeology in Northern Ireland" provides a snapshot of Northern Ireland's Maritime Heritage.
- This, along with the first CMF booklet "Integrated Coastal Zone Management", can be found on the CMF Website at:

  www.coastalmarineni.com/index/informationresources/publications.htm
- The Forum also hosted a major conference on 10–11 April 2008. This was a joint venture with I-CoNet, The Irish Coastal Network. The main theme of the conference was sea bed mapping and was used as a vehicle to present interim results of a Joint Irish Bathymetric Survey (JIBS) being carried out by the Marine Institute of Ireland and the Maritime and Coastguard Agency from the UK. The project covers a 40 mile stretch of the seabed from Malin Head in Ireland to Torr Head in Northern Ireland out to 3 nautical miles. It is part of a larger mapping project around the coast of Ireland. The project's survey work was completed at the end of June 2008. See the conference report at

  www.coastalmarineni.com/index/informationresources/publications.htm
- The bathymetric data gathered will be incorporated into the latest nautical charts of the area and can be downloaded on the JIBS web site at https://jetstream.gsi.ie/jibs/index.html with a "flythrough" generated from the data available at www.focusbiz.co.uk/mca/video/rathin.wmv
- The Forum also supported a one day conference on 27 November 2008, 'The Coast - Are we Managing?', organised by the Strangford Lough Management Advisory Committee. This conference was aimed at those decision makers managing the coast or developing activities along it. Practical examples of different management approaches from around the Irish and UK coasts and also from the United States of America.
- The Forum will become involved in several projects relating to the coastal zone and Department of the Environment is presently involved in seeking funding through several sources including Rural Development Pro-

gramme Fund. One such project is looking at sustaining the population on Rathlin Island through sustainable tourism and environmental projects.

Wales

- The ICZM Strategy for Wales was launched in March 2007 setting out the importance of ICZM and what it would mean for Wales. The Strategy lists 20 objectives for various bodies in Wales to carry out in order to develop and improve ICZM. The first annual Progress Report was published in March 2008 showing that positive progress has been made towards meeting these objectives. A second annual Progress Report will be published in March/April 2009.
- The Countryside Council for Wales (CCW) and the Making the Most of the North Wales Coast initiative has undertaken work to develop recommendations for taking forward ICZM in North West Wales, and discussions are underway to integrate marine and coastal issues into the Mon a Menai regeneration programme and within the North West Wales Spatial Plan.
- The Countryside Council for Wales have provided grant aid to CoastNet, who are undertaking work with partners to identify the current needs of Local Authorities in terms of guidance to support decision-making in relation to coastal issues. Guidance will be developed during 2010 following dialogue with Local Authority interests during 2009. The Wales Coastal and Maritime Partnership, the Environment Agency and the Wales Local Government Association are contributing to this work.

Isle of Man

- Isle of Man is party to the Irish Sea Region Platform established by the North West England regional assembly and is co-operating on an Irish Sea regional INTERREG bid which would see the Island involved in the transnational cooperation work strand of the package.
- The aim of this work would be to create long term alliances and networks of communication and includes developing options for extending this co-operation to include a framework for marine spatial planning. The work will also be used to inform an assessment of current arrangements for the Irish Sea and to propose ways in which these might be strengthened.
- The Isle of Man is undertaking a three year project to designate the first Marine Nature Reserve in Manx waters and aims to implement the first site by June 2011. An important part of the project will be effective communication and collaboration with neighbouring jurisdictions in the Irish Sea. Marine Officers from the Isle of Man have been closely following the development of the UK's Marine Conservation Zones and they have been contacted for their views on the marine protection strategy in England's adjacent waters.
- The Island is in direct communication with the UK conservation agencies (Natural England and Joint Nature Conservation Committee (JNCC)) over how the two jurisdictions might work co-operatively within the Irish Sea on Marine Protected Areas. The Isle of Man administration will also be involved in the Irish Sea projects to ensure a consistent and coordinated approach to marine management across the Irish Sea.

- The Island engages with adjacent administrations on fisheries issues regularly and is currently discussing the Fisheries Management Agreement. The island is committed to positive fisheries conservation measures and has now closed two areas to scallop dredging.

Jersey

- The States of Jersey formally adopted their ICZM strategy, 'Making the Most of Jersey's Coast. An Integrated Coastal Zone Management Strategy for Jersey' at the end of 2008. Work to take the strategy forward will include: habitat-mapping for Jersey's inter-tidal areas; a review of all designated and proposed protected areas to ensure that Jersey's network of marine and coastal protected areas is fully representative, and the development of a Shellfish Management Plan.
- Early actions are going to be focussing on conservation plans for declining marine birds, No-Take zones and Management plans for Coastal Ramsar sites.
- A related project is **ECO-ACTIVE Marine**, an extension of Jersey's successful ECO-Active programme which is designed to heighten awareness and provide advice on improving environmental behaviours. One of the first initiatives was to get local charter operators trained under the WiSe (Wildlife Safe) Scheme and develop a local Marine Wildlife Watching Code.
- The spatial planning aspects of the Strategy are being integrated into the current review of Jersey's Island Plan (Jersey's equivalent of a structure plan / local plan), which will ensure that ICZM is embedded within the Island's spatial planning policy. This is particularly important in Jersey as planning law extends to the edge of territorial waters.

Guernsey

- ICZM is implemented in Guernsey largely through application of the land planning legislation and policies. Current initiatives for renewable energy from the sea are being expedited as part of the Islands Energy Policy. This work presents the potential for significant additional impacts in the marine environment and hence a cross department working group has been set up to ensure effective co-ordination of the various interests and to harmonise the regulatory application.
- Guernsey is building on its Coastal defence study carried out in 2007 with local detailed flood sensitivity analysis. This additional information will further inform the option appraisal for enhancing coastal defences whilst protecting habitats.
- A major review (stocktake) of the issues, stresses and impacts on its eastern coast has been put into abeyance pending the outcome of a major public consultation entitled *'Guernsey Tomorrow'*. The nature of Guernsey's shores, the support of traditional industries and the stresses being placed on land and seas are common themes emerging from the consultation process and on which planning policies for the future will be based. There is an intention to apply and develop these integrated overarching policies into a more detailed Coastal and Countryside management strategy.
- Apart of its Government Business Plan, Guernsey is drafting an Environmental Plan setting out its vision and policies for the environ-

ment for the period up to 2030. This plan will be supported by an annual action plan which will seek to deliver the emerging coastal policies and strategies.